Archives of Clinical Research  
(ACR)  
Volume 5, Number 1 June 2017.

Editorial Board

Editor-in-Chief  
Prof. S.O. Samuel

Editor  
Dr. K.J. Adebayo

Managing Editor  
Dr. E.E. Esezobor

Editorial Board Members
Prof. J.E. Onuminya  
Prof. G.O. Akpede  
Prof. P. Egharevba  
Prof. S. Osuede  
Prof. A.U. Omorogie  
Prof. C.I. Ajuwa  
Prof. L. Anyanwu  
Prof. V.C Onuora

Editorial Advisers
Prof. D.E. Agbonlahor  
Prof. DI Aigbomian  
Prof. J.E.A Osemeikhian  
Prof. O.I Eguavoen  
Prof. S.A. Okecha  
Prof. P. Aloamaka  
Prof. S.U. Remison  
Prof. P.O Onolehemhen  
Prof. I.B Enweani  
Prof. F.E. Okonofua  
Prof. A.B. Ebeigbe  
Prof. J.O Ibu  
Prof. I. Abdu-Aguye  
Prof. M.T. Shokunbi  
Prof. P.O. Obeka  
Prof. M.I Oginni  
Prof. O.O. Mbonu  
Prof. O. Onuba  
Prof. F.C. Akpuaka  
Prof. J.T. da Rocha-Afodu  
Prof. Ewan Alufohai  
Prof. O.M. Oluwatosin  
Dr. S.O. Dawodu

Editorial Secretary  
Emeke-Ijeh Vivian

Editorial Office  
Dean’s office  
Faculty of Clinical Science  
College of Medicine, Ambrose Alli University,  
P.M.B., 14, Ekpoma, Edo State, Nigeria.  
e-mail:fclinalicals@gmail.com

Editorial Notice
Archives of Clinical Research (ACR), the official publication of the Ambrose Alli University, Ekpoma, Nigeria, publishes original research papers, review articles, techniques, short reports case reports, letters conferences proceedings and book reviews from all over the world, in all aspects of science.

Aim and Scope
Archives of Clinical Research is a peer-review journal in clinical sciences. It is international in scope and publishes articles of scientific excellence written in English, in all aspects of Clinical sciences. It is published once a year.

Subscription
Annual Subscription rate in Nigeria including postage is N1500.00. Annual subscription rate for other countries is $150.00 including postage. Cheques should be made payable to the ACR and addressed to the Editor-in-Chief.

Advertisement
Booking and inquiries should be sent to the Editor-in-Chief.

Correspondence
All correspondence including manuscripts for publication should be addressed to the Editor through the editorial office.

All right reserved
No part of this publication may be reproduced, stored in retrievable system or be transmitted in any form or by any means without the written permission of the Editor-in-Chief.
INSTRUCTIONS TO AUTHORS

Submission of Manuscripts

Conditions
Submission of manuscripts implies that the work described has not been published before (Except in the form of an abstract or thesis): That it is not under consideration for publication elsewhere, that its publication has been approved by all authors, if any, as well as by the responsible authorizes at the institution where the work has been carried out. Manuscripts submitted for publication are processed with the implicit understanding that human subjects have given informed consent and that the institutional research ethics committee has approved the study protocol. It is the responsibility of the contributors to obtain permission to produce illustrations, tables, and figures from other publications. The Editor-in-Chief reserves the right to modify the style and length of contribution.

Manuscripts
Manuscripts should be submitted in triplicate to the Editor-in-Chief. The typed manuscript should be double spaced with liberal margins on good quality A4 size paper. Typed size should not be smaller than 12points and standard font is preferred (e.g. Times New Roman, Arial, Calibri or Modern). The pages should be numbered and arranged in the following order: title page, abstract, key words, text, acknowledgement and reference. Legends and tables should be placed with the text where cited as much as possible.

Title page
Title page should include a concise descriptive title of the article, the author’s name, institution’s affiliations, the named an address of the individual responsible for editorial correspondence and the running title.

Abstract
Each article should include an abstract of not more than 250 words. The abstract should give the rational for the study, describe the methods, present the significant results and state succinctly the interpretation of the data.

Keywords
Author(s) should supply up to four key words that may be used for indexing from the list provided. This should be placed at the end of the abstract.

Text
Text should be organized as follows: Introduction, Methods, results, discussion, and references. The Introduction should describe the purpose of the study in relation to previous work in the field. Method should be concise but sufficiently detailed to permit replication by other researchers. Previously published methods and results should be cited by references. Result should present relevant positive and negative findings of the study, supported where possible by reference to the tables or figures. The discussion should interpret the result of the study with emphasis on their relation to the original concept and to previous studies: also the importance of the study and its limitations should be discussed.

Acknowledgement
Acknowledgement, if any, of those who contributed to the research or preparation of the paper should follow text, as well as the acknowledgment of grants and other support.

Reference
Reference should be typed doubled-spaced in numerical sequence according to the following format:

Journal Articles
Use Vancouver style and see index medicus for abbreviated titles

Books

Chapter of Books

All the reference must be cited in the text.
These should be numbered serially in the text and listed in the order cited. All the reference numbers should be inserted in superscript style in the text e.g. as reported by Lambo in 1986\(^1\). If there are six or fewer authors, list all; For seven or more, list first three and add et al. Authors are responsible for the accuracy of their reference and for correct text citation. Unpublished and personal
communications do not belong in the reference list; they should be cited in the text.

**Figures**
Glossy unmounted prints should be submitted in triplicate in a separated envelope backed by cardboard. Each figure should be numbered on the back (Arabic) according to order of mention in the text. The first author’s name, a short title of figure (use only soft lead pencil) should be included. Illustrations should be prepared and submitted in sizes that can be reduced to one column width or 7.5x10cm (3 1/8”). The original art for line drawing should be prepared with black Indian ink or laser jet and should be reproduced in black and white photographs.

**Legends**
Legends should be typed doubled-spaced on a separate page, with all abbreviations and symbols appearing on the illustration described.

**Table**
Tables should have titles and be numbered (Arabic) according to order of mentions in the text.

**Units of Measurement**
All measurement should be in SI (System International) Units.

**Reviews and Publication Selection**
Manuscripts are evaluation by at least two expert reviewers assigned by the editors. Provisional or final acceptance is based on originality, scientific content and topical balance to the journal. If the manuscript is accepted, the final revision must be submitted on diskette. Rejected manuscript(s) will not be returned to the author(s) unless this is specifically requested.

**Proof**
The corresponding author will receive galley proofs. Correction of proofs should be restricted to typographical errors only and returned to the Editor-in-Chief within two weeks.

**Publication**
After acceptance, manuscripts generally will be published within 6 months. Authors can help to accelerate publication by promptly attending to revisions and adhering to the guidelines described here.

---

**Cost to Authors**
Authors are charged:
1. Handling charge of N30,000.00(Nigeria) $600.00 (for other countries) which must accompany each manuscript submitted for publication.
2. Expenses for colour reproduction of figures
3. Expenses for reprints. Price lists are sent with galley proof.

**Book Reviews**
ACR will review selected books in all aspects of sciences from time to time. Authors interested in having a book reviewed should send a copy to the Editor-in-Chief.
## TABLE OF CONTENT

### ORIGINAL ARTICLE

1. Antibiotic susceptibility pattern of Klebsiella isolates at University Teaching Hospital, Ilorin  
   Akanbi II AA, Adedoja AA, Nyamngee A, Njaan A A, Igbodalo, M, and Olubiyi SK  
   
2. Assessment of ocular axial length as a factor in refractive errors (myopia and hyperopia)  
   Irabor PFI, Akhigbe AO, Adetiloye VA, Akhigbe OT, Ejakpovi EB  
   
3. Bacteria agents of diarrhoea in children under 5 years of age in Ilorin.  
   Akanbi II AA, Nyamngee A, Adedoja AA, Njaan AA, Olubiyi SK.  
   
4. Effects of acute consumption of *garcinia kola* on hepatic enzymes in apparently well Nigerian youths.  
   Biliaminu SA, AbdulAzeez IM, Shittu RO, Ajani S  
   
5. Health related quality of life of the elderly in a Peri-Urban Community in South-South Nigeria  
   Asogun AD, Ochei O, Momoh J, Okakah F, Omorogbe O, Oshomah I.  
   
   Oriaifo N, Eifediyi RA, Egiebefoh J, Aigbonoga M,  
   
7. Histopathological review of peripheral lymphoid organs in children in a sub-urban setting  
   Igbe AP, Owobu CI  
   
8. Morphological pattern of paediatric tumours in Warri, Southern Nigeria  
   Igbe AP, Nwanchokor FN, Forae GD  
   
   Mokogwu ATH, Onohwakpor EA, Mokogwu EE  
   
10. Open motorcycle wheel spoke achilles tendon injury among children in A Suburban African setting  
    Esezobor EE, Awe OO, Nwokike OO, Amouzou KS, Aigbonoga QO  
   
    Adebayo KJ, Osuji KC  
   
12. Perception and use of labour analgesia among antenatal attendees in a sub urban Nigerian population  
    Omoreghee HI, Eifediyi RA, Eiguebefoh J, Momoh M, Oriaifo N.  
   
13. Prevalence of Multidrug Resistant Bacteria on Selected Hospital Surfaces in Paediatric wards of a Nigerian Hospital  
    Akanbi II AA, Saka KH, Obasa TO, Nyamngee A, Raheim RA, Oshodi, AJ, Olubiyi SK  
   
14. Prevalence of toxigenic fungi in some staple foodstuffs in Plateau and Taraba States, Nigeria.  
    Mokogwu ATH, Onohwakpor EA, Mokogwu EE  
   
### CASE REPORT

   Odike AI, Akhigbe IE, Ekuma CN.  
   
16. Proximal femoral focal deficiency: Case Report  
    Akhigbe OT, Obi- Egbedi-Ejakpovi EB, Irabor PFI.
Antibiotic susceptibility pattern of Klebsiella isolates at University Teaching Hospital, Ilorin

Akanbi II AA,1 Adedoja AA,2 Nyamngee A,1 Njaan A A, Igbodalo. M,3 and Olubiyi SK4

1. Department of Medical Microbiology and Parasitology, College of Basic Medical Sciences, University of Ilorin, Ilorin.
2. Department of Medical Microbiology and Parasitology, University of Ilorin Teaching Hospital, Ilorin.
3. Department of Pharmacology, College of Basic Medical Sciences, University of Ilorin, Ilorin.
4. Department of Nursing, Faculty of Clinical Sciences, College of Health Sciences, University of Ilorin.

Abstract

Klebsiella, a major component of the normal intestinal flora is an important member of the family Enterobacteriaceae. They account for 80 percent of clinical significant isolates. The aim of this study is to isolate Klebsiella species and determine their antibiotic susceptibility pattern. Klebsiella species were isolated from various clinical samples brought to the microbiology laboratory. All routinely identified Klebsiella isolates were characterised by sub culturing onto MacConkey agar. The sensitivity rate of the isolates to some selected, popularly used and readily available antibiotics was determined. Beta lactamase production of the isolates was determined by the double disc synergy test (DDST). About One hundred and sixty-four isolates of Klebsiella were examined. Two species of Klebsiella were identified, and they are Klebsiella pneumoniae 88.0% and Klebsiella oxytoca 12.0%. Thirty-two of the isolates were found to contain ESBL. The most active antibiotic was Piperacillin 100%, Imipenem 98.2% Sulbactam, 74.9% and Azithromycin 73.2%. The isolates that expressed extended spectrum beta-lactamase were susceptible to Imipenem and Piperacillin, moderate sensitivity to Ofloxacin 69.9% and Ciprofloxacin 56.3%. The isolates were resistant to Augmentin 72.8%, Cefuroxime 72.5%, Ceftriaxone 60.0%. The study recommends the effective use of the laboratory for determination of the sensitivity pattern of clinical isolates rather than relying on empirical use of antibiotics, because the sensitivity pattern of these clinical isolates keep changing.

Keywords: Klebsiella, Isolates, Sensitivity Pattern, ESBL.

Introduction

Klebsiella is a genus of the family Enterobacteriaceae and members of this genus are defined as Gram negative, non-motile, capsulated aerobic to facultative anaerobic bacilli; which are catalase positive and oxidase negative1. Enterobacteriaceae are major component of the normal intestinal flora but are relatively common in other body sites2. They are major cause of nosocomial infections and may account for 80% of clinically significant isolates of Gram negative bacilli in clinical microbiology laboratories and 5% of all clinically significant isolates3,4,5.

Klebsiella are isolated in many types of human infections, such as abscesses, pneumonia, meningitis, septicaemia, intestinal and urinary tract infections6,7,8. Hospitalized patients often become colonized with Klebsiella species and among the Enterobacteriaceae, they are major cause of hospital acquired infections5. Nosocomial Klebsiellapneumoniae is associated with a high mortality in both neonates and adults and antimicrobial treatment of such infections has been complicated by the emergence of multidrug resistant strains9 Enterobacteriaceae are known for their production of enzymes known as beta lactamase which degrade the beta lactam ring of the beta lactam antibiotic group such as the Penicillin’s and the Cephalosporins10.
There is one group of beta lactamases that is essentially found in certain species of Gram negative bacilli usually in Klebsiella and Escherichia coli; and these enzymes are termed extended spectrum beta lactamase (ESBL). These enzymes confer upon the bacterial the additional ability to hydrolyse the beta lactam ring of Cephalosporin such as Cefotaxime, Ceftazidime and Aztreonam. Several outbreaks of infection with ESBL-producing Klebsiella spp have been reported from South Africa, Ghana, and in many centres in Nigeria. The aim of this study is to determine the antibiotic sensitivity pattern of Klebsiella isolates from clinical samples.

Materials and Method

This study was conducted at the microbiology laboratory of the University of Ilorin Teaching Hospital between June and December 2015. A total of 164 isolates were examined. Klebsiella isolates from swabs, urine, blood culture, CSF, Semen, and Sputum constituted the sample size. All routinely identified Klebsiella species were characterized by sub culturing at 37\(^\circ\)C. The organisms that conform to the genus were further tested biochemically to differentiate them in to species. The tests were glucose fermentation for acid and gas production, Dulcitol and Glucose fermentation at 5\(^\circ\)C. The other tests include Methyl Red (MR) and Voges ProsKauer (VP).

Extended spectrum beta lactamase was detected in isolates that were found to be resistant to Ceftazidime, Ceftriaxone and Cefotaxime, using double disc synergy test (DDST). Plates of Mueller-Hinton agar were prepared with Ceftazidime and Cefotaxime in a concentration of 30 µg were placed 15mm center to center from Amoxicillin-clavulanic acid disc (20 and 10 µg). The inoculated media were incubated for 18-24 hours at 37\(^\circ\)C. Enhanced zone of inhibition between any of the beta lactam discs and the disc at the center were recorded. Antibiotic susceptibility test was performed on all the isolates using the disc diffusion method (CLS1 2010). The zone of inhibition of the antibiotics were measured and interpreted as per Clinical laboratory standard institute recommendations. Eleven different antibiotic discs commonly prescribed by the clinicians at the University of Ilorin Teaching Hospital were used and these are Gentamicin (10µg), Ciprofloxacin (5µg), Imipenem (10µg), Augmentin (30µg), Azithromycin (15µg), Ofloxacin (5µg), Cefuroxime (30µg), Ceftriaxone (30µg), Ceftazidime (30µg), Sulbactam (10µg), and Piperacillin (100µg). Escherichia coli ATCC (25922) strain were used as control culture.

Results

Table 1: Biochemical characterization of Klebsiella species

<table>
<thead>
<tr>
<th>Klebsiella Spp</th>
<th>Lac</th>
<th>Duc</th>
<th>Gas in Gluc/Glu/5(^\circ)C</th>
<th>MR</th>
<th>VP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumoniae</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Oxytoca</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Ozaenae</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Planticola</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Rhinoscleromatis</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2: Sensitivity and Resistance pattern of the isolates

<table>
<thead>
<tr>
<th>Type of Antibiotic</th>
<th>No tested</th>
<th>No. sensitive(%)</th>
<th>No. resistance(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azithromycin</td>
<td>92</td>
<td>67 (72.2)</td>
<td>25 (27.8)</td>
</tr>
<tr>
<td>Sulbactam</td>
<td>46</td>
<td>34 (74.9)</td>
<td>12 (26.1)</td>
</tr>
<tr>
<td>Augmentin</td>
<td>103</td>
<td>28 (27.2)</td>
<td>75 (72.8)</td>
</tr>
<tr>
<td>Imipenem</td>
<td>56</td>
<td>55 (98.2)</td>
<td>1 (1.8)</td>
</tr>
<tr>
<td>Piperacillin</td>
<td>26</td>
<td>26 (100.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>117</td>
<td>61 (52.1)</td>
<td>56 (47.9)</td>
</tr>
<tr>
<td>Cefuroxime</td>
<td>80</td>
<td>22 (27.5)</td>
<td>58 (72.5)</td>
</tr>
<tr>
<td>Ofloxacin</td>
<td>73</td>
<td>51 (69.9)</td>
<td>22 (30.1)</td>
</tr>
<tr>
<td>Rocephin</td>
<td>130</td>
<td>52 (40.0)</td>
<td>78 (60.0)</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>109</td>
<td>65 (60.0)</td>
<td>44 (40.0)</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>119</td>
<td>67 (56.3)</td>
<td>52 (43.7)</td>
</tr>
</tbody>
</table>

Table 3: Pattern of infections caused by the isolates.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes Mellitus</td>
<td>4</td>
<td>2.4</td>
</tr>
<tr>
<td>Osteomyelitis</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>Meningitis</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Cerebro Vascular Accident</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Chronic Renal Disease</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Abscesses</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>Burns</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Cathether</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Ear discharge</td>
<td>22</td>
<td>13.4</td>
</tr>
<tr>
<td>Septicaemia</td>
<td>77</td>
<td>47.0</td>
</tr>
<tr>
<td>Wound infections</td>
<td>38</td>
<td>23.2</td>
</tr>
<tr>
<td>Urinary Tract Infection</td>
<td>9</td>
<td>5.5</td>
</tr>
<tr>
<td>Total</td>
<td>166</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4: Gender distribution of the isolates.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>76</td>
<td>45.8</td>
</tr>
<tr>
<td>M</td>
<td>90</td>
<td>54.2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>166</td>
<td>100</td>
</tr>
</tbody>
</table>

Discussion

Two species of *Klebsiella* were identified in this study and these are *K. pneumoniae* and *K. oxytoca*. *K. pneumoniae* was the predominant species and this accounts for 88.0% of the total isolates. This is similar to the findings of a study done in Lagos, Nigeria; where over 90% of the clinical isolates of *Klebsiella* were *K. pneumoniae*; but at variance with another study from same location where four species of *K. pneumoniae* were isolated. Usually the most frequently isolated strains of *Klebsiella* is *K. pneumoniae* which is a recognized pathogen. It accounts for large numbers of hospital and community acquired infections involving the urinary tract, blood and lungs.

Antimicrobial resistance among Gram-negative bacilli is a major problem in hospital acquired infections with increasing morbidity and mortality more especially when infections are caused by drug resistant organisms. In this study, the most effective antibiotic is Piperacillin with a sensitivity pattern of 100% and this agrees with the finding of a study in India where Piperacillin was equally found to be 100% sensitive to all the clinical isolates. This finding is at variance with the report of a study where *K. pneumoniae* isolates were resistant to *Piperacillin*. This antibiotic is not commonly prescribed by physicians in the location of the present study. In addition, Piperacillin is an injectable and it is usually given in combination with another drug called Tozobactam. Injectable generally are rarely abused or misused by patients except for the over use by physician. Piperacillin-Tozobactam is a very useful combination against Klebsiella strains with extended spectrum beta lactamase production. Nevertheless, some ESBL producers have been found to be resistant to Piperacillin.

Another remarkable antibiotic with high sensitivity is Imipenem, with a sensitivity of about 98.2% to the isolates of *Klebsiella* species. This finding however agrees with the report of Namara and others who recorded 100% sensitivity of *Klebsiella* to Imipenem. This report also correlates with the findings of Innocent in Uyo. High sensitivity of Imipenem in this environment could be due to the high cost of the drug. Imipenem is expensive and it is only in injectable. These prevents its adulteration and abuse hence its high sensitivity to bacterial infection.

Sulbactam however in the study is found to be effective against the *Klebsiella* isolates. The sensitivity in this present study is 74.9%. The antibiotic is mostly used in the hospitals and the chance of been abused is less. It is commonly used in the Paediatric populations and rarely prescribed for adults in the area of the study as compared to the oral preparations.

Ciprofloxacin and Ofloxacin are the two Quinolones tested in this study. The isolates are still moderately susceptible to Ofloxacin with a sensitivity pattern of 69.9% and the sensitivity of Ciprofloxacin is on the downward trend with a sensitivity of 56.3%. This finding is at variance with result of Boma and friends who demonstrated that Quinolones was the most potent antimicrobial against Gram negatives, more especially *Klebsiella* isolates. In their study both Ofloxacin and Ciprofloxacin were found to be 90% effective against *Klebsiella* species. The Quinolones nowadays are commonly prescribed and are readily available over the counter. Ciprofloxacin are more often prescribed more than Ofloxacin and this could be responsible for the decreasing sensitivity because of over use.

The isolates were found to be resistant to the Cephalosporins in use except Ceftazidime which shows a sensitivity of 65%. However, the isolates were 78.0% and 58.0% resistant of Ceftriaxone and Cefuroxime respectively. The antibiogram pattern of the isolates in this study revealed a decrease in sensitivity to the commonly used antibiotics. The resistance of the isolates to Cephalosporins is an indication of ESBL production. Some isolates were found to be multidrug resistant and were found positive for ESBL production. This supports the findings of other scientists where *Klebsiella* was found to be resistant to Cefuroxime and Ceftriaxone. The emergence of resistance of *Klebsiella* to the Cephalosporin have been widely reported.

The preponderance of the isolates was from males. *Klebsiella*, a pyogenic organism was seen to cause a variety of infections in Ilorin. Most the isolates were from blood 47.0%, wound 23.2% and ear discharges...
13.4%. The ability of Klebsiella to evade host immune system and the production of enzymes such as Extended Spectrum Beta Lactamase can be responsible for the high rate of septicemia in this study.

The bulk of the isolates were seen in the age group 1-10 years, this is contrary to expectation. Persons with alcoholism are usually the main population at risk and they contribute 66% of people usually affected by this infectious agent.31,32

Conclusion

This study has shown that Klebsiella species are isolated in many types of infection in our environment and Klebsiella pneumoniae is the predominant species. Some of the isolates are ESBL producers, although the prevalent is not high. The use of some first line antibiotics such as Cefuroxime, Ceftriaxone and Augmentin are inappropriate in the treatment of infection caused by these isolates. Piperacillin and Imipenem were the most sensitive drugs and could be administered empirically. Though expensive but are cost effective. However, the issue of cost could be addressed by effective implication of the National Health Insurance Scheme. The study suggests an effective antibiotic control policy to prevent further escalation of ESBL producers in this environment. The clinicians should rely on the laboratory sensitivity pattern of isolates rather than the use of empirical antibiotics in the management of infection caused by Klebsiella species.

References

18. Clinical and Laboratory Standards Institute, Performance Standard for antimicrobial susceptibility testing. Approved standard M100- Laboratory Standards,2010,Wayne, PA, USA.
20. Ogunsola FT, Odugbemi OS, Kesah CN. Ogunsola TO. The prevalence and antibiotic Susceptibility patterns of various Klebsiella species in clinical samples and implication for control of hospital acquired infections. Nig. QJ. Hosp. med 1998; 8; 158-163.


Assessment of ocular axial length as a factor in refractive errors (myopia and hyperopia)

Irabor PFI1, Akhigbe AO2, Adetiloye VA3, Akhigbe OT4, Ejakpovi EB5

1. Department of Radiology, Irrua Specialist Teaching Hospital, Irrua
2. Department of Radiology, University of Benin Teaching Hospital, Benin.
3. Department of Radiology, Obafemi Awolowo University Teaching Hospital, Ile-Ife
4. Department of Radiology, Irrua Specialist Teaching Hospital, Irrua
5. Department of Radiology, Irrua specialist Teaching Hospital, Irrua

Abstract

Background: Refractive errors account for a large proportion of patients presenting with visual impairment. In the developed nations, ocular axial length has been found to be the strongest determinant of refractive errors, however, there is paucity of knowledge on this issue in the West African sub-region. This study was undertaken at the University of Benin Teaching Hospital to determine the relationship between axial length and the form of refractive errors seen.

Study Design: A prospective study of the ultrasonic measurement of the axial length of the eye in 100 myopic and 100 hyperopic adult patients was carried out over a 6-month period. All the patients had refraction and were confirmed to have either of refractive errors by the ophthalmologist.

Result: Ocular axial lengths were consistently higher in the myopic patients than in the control group (P<0.001) while axial lengths were consistently lower in the hyperopic patients in comparison to the control group (P<0.001). There was no significant difference between the axial length of the right and left eye in any one individual whether myopic or hyperopic. Myopia was found to be common in the younger age group in contrast with hyperopia, which was mainly seen in the middle aged and elderly. In addition, individuals with higher body mass indices were found to have shorter axial lengths than those with lower body mass indices, therefore the heavier patients were mainly hyperopic while the lighter ones were myopic.

Conclusion: This study showed a strong association between myopia and longer axial length and this is synonymous with large eyeballs. On the contrary, a shorter axial length was found in the hyperopic group indicating a smaller eyeball size.

Keywords: Axial length, refractive errors, myopia, hyperopia.

Introduction

Refractive error is one of the commonest causes of visual impairment and it cuts across all age groups and races.1-3 The pathophysiology and pathogenesis of ocular refractive errors are still a matter of controversy however, the following have been implicated.4-13

i. Heredity

ii. Reading at an early age/amount of near work

iii. The size of the eyeball, which has a direct relationship to the axial length of the eye, among other factors.

The axial length of the eye, however, is a more constant factor14,15,16. Factors which influence the eyeball size of an individual include height, weight or body mass index (BMI) and heredity10,16.

Some researchers feel that reading at an early age may contribute to increasing nearsightedness; some even find a link between increasing nearsightedness and

Corresponding Author: Irabor PFI
Department of Radiology, Irrua Specialist Teaching Hospital, Irrua
pamrab@yahoo.com
intelligence\textsuperscript{12,17}. However, this does not suggest that farsighted individuals are less intelligent\textsuperscript{17}.

In myopic images from distant objects are formed in front of the retina due to excessive focusing power of the lens and the large eyeballs with longer axial length. Myopia typically begins in late childhood (age 8 or 9) and usually stabilizes by the mid twenties\textsuperscript{13,18}.

In hyperopia, near objects are focused behind the retina due to poor focusing power of the lens and the smaller eyeball. Hyperopia frequently does not cause symptoms until the fourth or fifth decade and then progressively gets worse as the lens of the eye becomes stiffer and unable to focus\textsuperscript{13,18}.

The aim of this study is to determine any variation in axial length as a factor in these two forms of refractive errors.

**Materials and Methods**

The study was composed of assessment of ocular axial lengths of two hundred (200) adult Nigerians; 100 cases of myopia and 100 cases of hyperopia. This included consecutive prospective cases of these groups of patients seen at the University of Benin Teaching Hospital from June 2008 to November 2008. All the patients are those attending the ophthalmology clinic and confirmed to have refractive errors. Vital data obtained from the request cards and case notes of the patients included the age, sex, presenting complaint, duration of symptom and power of corrective lenses used in Diopters.

All ultrasonic assessment was carried out in this centre and referrals were mainly from the optometry section of the Ophthalmology clinic. Informed consent was obtained from the patient before commencement of the procedure and before the use of their optometry records. Questionnaires were filled out by or for each patient. Written approval was also obtained from the ethics committee.

**Ultrasonic technique and image analysis**

The ocular scan was done in supine position with the head properly immobilized and the eyelids closed naturally (not tightly). The patient was instructed to keep a fixed gaze on the ceiling with the eyelids shut. A B – mode ultrasound scanner (Sonoace 1,500 Medison) with high frequency curvilinear probe of 6.5 MHz was used. The scan was done through the closed eyelid after applying a coupling gel. Measurements were taken with the electronic cursor demonstrating the optical axis on the frozen image (Fig. 1). Care was taken not to apply pressure on the globe while scanning to avoid subjective shortening of the axial length as well as patient discomfort.
D. Diagram showing points to be measured for accurate axial length

Results

One hundred myopic patients (60 females, 40 males) aged 18-49 years (mean 29.42 years) and 100 hyperopic patients (60 females, 40 males) aged 20-69 years (mean 50.30 years) were studied. The anthropometrical measurements in the myopic and hyperopic patients are shown in Table 1. In the group with myopia, the mean height, weight and body mass index was 161.30 cm, 64.08 kg, 24.70 respectively while the group with hyperopia had mean height, weight and body mass index of 161.73 cm, 72.98 kg, 27.98 respectively.

The myopic male patients had a lower mean height (160.30 cm) than the females (161.80 cm), however, the mean height and body mass index in males was higher (64.90 kg, 25.27) than the females (63.68 kg, 24.41).

Also in the study of group with hyperopia the mean height for the males was lower (161.58 cm) than the females (161.80 cm). Similar the mean weight and body mass index in males was higher (73.40 kg, 28.17) than the females (72.78 kg, 27.88) (Table 1).

Axial length of the eyeball in myopes

The mean axial length of the right and left eye for males is 2.305 cm ± 0.143 cm and 2.300 cm ± 0.121 cm with a median of 2.300 cm for both eyes. The mean axial length of the right and left eye for females is 2.313 cm ± 0.121 cm and 2.323 cm with a median of 2.300 cm for both eyes (Table 2). A comparison of the mean axial length of the right and left eye of both males and females was statistically insignificant at a P value of 0.838 and 0.519 respectively.

The mean power of the lens for right and left eye in males is -2.250 dioptres and -2.313 dioptres with a median of -2.25 dioptres and -2.50 dioptres respectively.

Axial length of the eyeball in Hyperopes

The mean axial length of the right and left eye for males is 1.940 cm and 1.930 cm with a median of 1.950 cm and 1.900 cm respectively. The mean axial length of the right and left eye for females is 1.920 cm and 1.923 cm with a median of 1.900 cm for both eyes (Table 2).

A comparison of the mean axial length of the right and left eye for males and females was statistically insignificant at a P value of 0.390 and 0.719 respectively.

The mean power of lens for the right and left eye of males is 2.800 dioptres and 2.788 dioptres with a mean of 2.000 dioptres and 2.625 dioptres respectively. The mean power of lens for the right and left eye of females is 2.656 dioptres and 2.675 dioptres with a median of 2.500 dioptres for both eyes (Table 2).

A comparison of the mean power of lens for the right and left eye of both males and females was statistically insignificant with a P value of 0.642 and 0.692 respectively.

Table 1: Anthropometric measurements in myopia and hyperopia

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Myopia</th>
<th>Hyperopia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>27.90 ± 6.63</td>
<td>48.55 ± 9.52</td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>160.30 ± 5.79</td>
<td>161.58 ± 3.58</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>64.90 ± 6.41</td>
<td>73.49 ± 13.17</td>
<td></td>
</tr>
<tr>
<td>Body mass index (BMI)</td>
<td>25.27 ± 2.23</td>
<td>28.17 ± 5.22</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Females</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>30.18 ± 8.57</td>
<td>51.18 ± 6.99</td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>161.80 ± 5.61</td>
<td>161.80 ± 4.24</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>63.68 ± 6.11</td>
<td>72.78 ± 13.57</td>
<td></td>
</tr>
<tr>
<td>Body mass index (BMI)</td>
<td>24.41 ± 2.89</td>
<td>27.88 ± 5.38</td>
<td></td>
</tr>
</tbody>
</table>
The mean age of patients with myopia in this current study is 29.42 years. This is lower than the mean age of 35 years found in a similar study of Alaskan Eskimos by Van Rens et al. This lower mean age may be a true reflection of the pattern of variation in axial length measurements by other studies. The same factors responsible for female preponderance in myopia may also be at play in hyperopia. Though these claims cannot be substantiated for now, future research will prove this right or wrong. In this current study, females outnumbered the males in the myopic and hyperopic sub groups.

A comparative evaluation of the mean age incidence of myopia and hyperopia shows that while myopia was more prevalent before the age of 40 years, hyperopia was commoner above this age, a finding that is supported by other works. Why this is so has been attributed to a lot of factors including axial length of the eyeball, heredity, the effect of reading at an early age and amount of near work as well as anthropometric measurements of the individuals.

Axial length has however been reported to be the strongest determinant of refractive errors. In this present study, myopics had a significantly longer mean axial length (2.310cm) than hyperopics (1.926cm) P < 0.001. Though this is the pattern of variation in axial length measurements by other studies, the exact values obtained by some of them were significantly higher than those obtained in our study. Koraszewska-Matuszewska et al. obtained a mean axial length of 2.300 ± 0.595 (cm) in females compared to 2.300 ± 0.128 (cm) in males. The sex prevalence in myopia was 66.7% for females and 33.3% for males. A similar study of Alaskan Eskimos also showed a higher frequency of females (48.3%) than males (41.3%) in the study as reported by Van Rens et al. The same study, however, reported that there was very little hyperopia seen in Eskimos before the age of 50 years, after which there was a rapid increase till about the age of 80 years. This current study did not show this pattern of increase. The following reasons may be responsible; with increasing age especially after 60 years, patients with refractive errors may develop other systemic diseases which are primarily unrelated to refraction but which result in deterioration of vision. These illnesses include diabetes, hypertension and cataract and therefore such patients were excluded from our study. Secondly the life expectancy in Nigeria is lower than what obtains in developed countries such as North America under which Alaska falls. Nevertheless, hyperopia is commoner in the older age group than myopia and this is the pattern in this current study.

More females (62.5%) were found to have hyperopia than their male counterparts (37.5%). A different observation was made in the study of Alaskan Eskimos with hyperopia by Van Rens et al in which more males (94%) were found than females (11.4%). The researchers did not provide the reason for the sex variation. The same factors responsible for female preponderance in myopia may also be at play in hyperopia. Though these claims cannot be substantiated for now, future research will prove this right or wrong. In this current study, females outnumbered the males in the myopic and hyperopic sub groups.

The sex prevalence in myopia was 66.7% for females and 33.3% for males. A similar study of Alaskan Eskimos also showed a higher frequency of females (48.3%) than males (41.3%) in the study as reported by Van Rens et al. The same study, however, reported that there was very little hyperopia seen in Eskimos before the age of 50 years, after which there was a rapid increase till about the age of 80 years. This current study did not show this pattern of increase. The following reasons may be responsible; with increasing age especially after 60 years, patients with refractive errors may develop other systemic diseases which are primarily unrelated to refraction but which result in deterioration of vision. These illnesses include diabetes, hypertension and cataract and therefore such patients were excluded from our study. Secondly the life expectancy in Nigeria is lower than what obtains in developed countries such as North America under which Alaska falls. Nevertheless, hyperopia is commoner in the older age group than myopia and this is the pattern in this current study.

More females (62.5%) were found to have hyperopia than their male counterparts (37.5%). A different observation was made in the study of Alaskan Eskimos with hyperopia by Van Rens et al in which more males (94%) were found than females (11.4%). The researchers did not provide the reason for the sex variation. The same factors responsible for female preponderance in myopia may also be at play in hyperopia. Though these claims cannot be substantiated for now, future research will prove this right or wrong. In this current study, females outnumbered the males in the myopic and hyperopic sub groups.

A comparative evaluation of the mean age incidence of myopia and hyperopia shows that while myopia was more prevalent before the age of 40 years, hyperopia was commoner above this age, a finding that is supported by other works. Why this is so has been attributed to a lot of factors including axial length of the eyeball, heredity, the effect of reading at an early age and amount of near work as well as anthropometric measurements of the individuals. Axial length has however been reported to be the strongest determinant of refractive errors. In this present study, myopics had a significantly longer mean axial length (2.310cm) than hyperopics (1.926cm) P < 0.001. Though this is the pattern of variation in axial length measurements by other studies, the exact values obtained by some of them were significantly higher than those obtained in our study. Koraszewska-Matuszewska et al. obtained a mean axial length of

---

Table 2: Axial length measurement in centimeters with power of lens in dioptres

<table>
<thead>
<tr>
<th></th>
<th>Myopia</th>
<th>Hyperopia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (cm)</td>
<td>Median (cm)</td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right eye</td>
<td>2.305 ± 0.143</td>
<td>1.940 ± 0.094</td>
</tr>
<tr>
<td>Power of lens</td>
<td>-2.250 ± 0.585</td>
<td>2.300 ± 0.121</td>
</tr>
<tr>
<td>Left eye</td>
<td>2.300 ± 0.121</td>
<td>1.930 ± 0.080</td>
</tr>
<tr>
<td>Power of lens</td>
<td>-2.313 ± 0.684</td>
<td>2.300 ± 0.129</td>
</tr>
</tbody>
</table>

Discussion

The mean age of patients with myopia in this current study is 29.42 years. This is lower than the mean age of 35 years found in a similar study of Alaskan Eskimos by Van Rens et al. This lower mean age may be a true reflection of the pattern of myopia in our local population or a reflection of the pattern of hospital visit but there are no previous works to support this. However, it has generally been reported that myopia is commoner in the younger age group especially below the age of 40 years in Nigeria is lower than what obtains in developed countries such as North America under which Alaska falls. Nevertheless, hyperopia is commoner in the older age group than myopia and this is the pattern in this current study.

More females (62.5%) were found to have hyperopia than their male counterparts (37.5%). A different observation was made in the study of Alaskan Eskimos with hyperopia by Van Rens et al in which more males (94%) were found than females (11.4%). The researchers did not provide the reason for the sex variation. The same factors responsible for female preponderance in myopia may also be at play in hyperopia. Though these claims cannot be substantiated for now, future research will prove this right or wrong. In this current study, females outnumbered the males in the myopic and hyperopic sub groups.

A comparative evaluation of the mean age incidence of myopia and hyperopia shows that while myopia was more prevalent before the age of 40 years, hyperopia was commoner above this age, a finding that is supported by other works. Why this is so has been attributed to a lot of factors including axial length of the eyeball, heredity, the effect of reading at an early age and amount of near work as well as anthropometric measurements of the individuals. Axial length has however been reported to be the strongest determinant of refractive errors.

In this present study, myopics had a significantly longer mean axial length (2.310cm) than hyperopics (1.926cm) P < 0.001. Though this is the pattern of variation in axial length measurements by other studies, the exact values obtained by some of them were significantly higher than those obtained in our study. Koraszewska-Matuszewska et al. obtained a mean axial length of

---

ACR

Irabor, et al; Assessment of ocular axial length as a factor in refractive errors (myopia and hyperopia)
2.605cm in myopia and a mean axial length of 2.000cm in hyperopia. This variation may be due to racial differences in eyeball sizes, the method of axial length measurement (contact or non-contact A mode ultrasonography) or a combination of both factors. This invariably means that eyes with longer axial lengths are commoner in younger individuals while eyes with shorter axial lengths are commoner in older individuals as confirmed by the aforementioned studies.\(^1\) - 8, 14 - 18.

It may be correct then to infer from this study and previous works that younger individuals have larger eyeballs than the older ones. The reason for this could be explained by the generalized reduction in organ sizes, as people grow older. This is further supported by a study of ocular dimensions with aging in normal eyes done by Lim et al\(^1\) using contact ultrasonography. They found a gradual decrease in ocular dimensions (axial length and anterior chamber depth) with increasing age in both sexes but this change was more prominent in females than males. The potential influence of systemic endocrine or metabolic factors may also be responsible for these changes.

In all groups of patients studied (myopes and hyperopes), the difference in axial lengths in the right and left eyes were statistically insignificant.

In myopes, the mean axial lengths for the right and left eyes were 2.310cm and 2.315cm respectively (P = 0.626) while in hyperopes, the mean axial lengths were 1.926cm and 1.925cm respectively (P = 0.854). These findings are not surprising as most paired organs within the human body are not symmetrical in size, for example, the kidneys, thyroid, ovaries amongst others.

Axial length measurements in both sexes were compared in the myopes and hyperopes. In each group of patients, the difference in axial lengths was statistically insignificant for both sexes. In myopes, the mean axial length was 2.305cm in males and 2.313cm in females (P = 0.838) while in hyperopia; the mean axial length was 1.940cm in males and 1.920cm in females (P = 0.834). These findings are at variance with the study by Osuobeni et al\(^8\) and Matuszewskas et al\(^14\) who found that males had longer axial lengths than females. The reason for these differences in both sexes is not known, however, hormonal and racial factors may have a part to play. This present study also showed that the mean axial length differed little between age groups in myopes and hyperopes, a finding also reported by Wickremasinghe et al\(^7\).

Refractive errors are corrected with lenses and this study showed that the longer the axial length in myopics, the lower in the negative value the power of lens worn by these patients, thus giving a negative correlation (r = 0.789). On the other hand, the shorter the axial length in hyperopes, the higher the power of lens worn by these patients also giving a negative correlation (r = 0.812). These findings were also reported by Lo et al\(^4\). The myopics use concave lenses (Negative Dioptre) while the hyperopics use convex lenses (Positive Dioptre). These lenses help to focus incoming light rays from objects onto the retina to form an image which otherwise would have been focused in front of the retina in myopics and behind the retina in hyperopic patients.

Saw et al\(^16\) carried out a study to examine the association between the anthropometric measurements of height, weight and body mass index (BMI) and refraction with ocular parameters in Singapore school children. They discovered that those individuals who were taller had eyeballs with longer axial lengths while those who were heavier (having larger weights and body mass index) had smaller/shorter eyeballs. They therefore concluded that controlling for age, gender, parental myopia, reading, school and weight showed that taller individuals had eye with longer axial lengths and refractions that tended towards myopia. Those who had higher weights and body mass index had shorter eyeballs with a refraction that tended towards hyperopia. Coincidentally, this study has displayed a similar pattern.

Overall, the patient with hyperopia had a significantly higher mean body mass index (BMI) of 28.17 for males and 27.88 for females than patients with myopia whose mean body mass index was 25.27 for males and 24.41 for females (P < 0.001). The differences in mean body mass index in males and females in the same group is however statistically insignificant (P = 0.834) and this further explains why the difference in axial length in both sexes in the same group was statistically insignificant.

The role of the radiologist in the management of refractive errors has been limited to identifying the complications of these visual disorders, a major and common complication being retinal detachment in high myopia. Routine ocular ultrasound scan is rarely
requested in patients who have been diagnosed by the ophthalmologist to have only refractive errors as the cause of visual impairment. Instead they are immediately referred to the optometrist to have refraction for which refractive lenses are quickly prescribed. Even though there is no permanent cure for refractive errors, a screening program can be designed for those at risk to have routine ocular biometry early. Leung et al\(^{3}\) conducted a 2-year study on high risk primary and secondary school children in a Chinese society with myopia and discovered that the early use of progressive lenses reduced the progression of myopia. These children had in the past been subjected to perform large amounts of reading and homework and thus spend long periods performing near work during their growth years. Therefore, if such children were followed up with routine ocular scans for the purpose of biometry before the onset of myopia, it may have been possible to pick up early and subtle changes in ocular sizes that may suggest the beginning of a refractive error.

Axial length measurements obtained by using the newer non-contact methods (IOL master, partial coherent interferometry and laser interferometry) and results obtained from this present study showed the same pattern of variation in eyeball sizes in patients with refractive errors. Myopics were found to have significantly larger eyeball sizes than hyperopics. Though the values obtained using this newer non-contact methods were higher than what was obtained here in our local population, the difference cannot necessarily be said to be due to the different techniques used as the populations studied are of different races. The population that was studied by the newer non-contact methods are Caucasians and no Nigerian studies have been done using either the newer non-contact methods or the contact A or B –mode ultrasonographic method.

In view of the above findings, it is therefore safe to conclude that the “through the eyelid” techniques of ocular biometry are reliable and justifiable.

**Conclusion**

From this study, myopics have been found to have longer axial lengths than hyperopics. Myopics were also found to be younger than hyperopic individuals. Those individuals with higher body mass indices were found to have shorter axial lengths than those with lower body mass indices, therefore the heavier patients were mainly hyperopic while the lighter ones were myopics. These findings were found to be similar to those of previous works done in other parts of the world.

**Recommendations**

(1) Ocular ultrasonography for axial length assessment should be part of the routine work up for patients with refractive errors or patients who are at risk of developing refractive errors.

(2) All patients who are incidentally found to have abnormal axial length measurements should be referred to the ophthalmologist for refraction.

**References**

15. Hepsen IF, Evereklioglu C, Bayramlar H. The effect of reading and near-work on the development of myopia in emmetropic


Bacteria agents of diarrhoea in children under 5 years of age in Ilorin.

Akanbi II AA¹, Nyamngee A¹, Adedoja AA², Njaan AA³, Olubiyi SK⁴.

1. Department of Medical Microbiology and Parasitology, College of Health Sciences, University of Ilorin, PMB 1515, Ilorin, Nigeria.
2. Department of Medical Microbiology and Parasitology, University of Ilorin Teaching Hospital, PMB 1415, Ilorin, Nigeria.
3. Department of Pharmacology, Faculty of Basic Medical Sciences, University of Ilorin, Ilorin.
4. Department of Nursing, Faculty of Clinical Sciences, College of Health Sciences, University of Ilorin.

Abstract

Diarrhoea is one of the commonest childhood illnesses, and a major cause of childhood morbidity and mortality in developing countries. Bacteriological investigation of diarrhoea diseases was carried out among 128 children between the ages of 0-60 months using stool samples from three different hospitals with in Ilorin metropolis. Out of the 128 children, 39 had bacteria associated diarrhoea. The prevalence of bacteria associated diarrhoea in this study was 23.2%. The bacteria isolated were Escherichia coli, Pseudomonas aeruginosa, Klebsiella Pneumoniae, Proteus vulgaris, Salmonella typhi and Campylobacter jejuni. Escherichia coli was the most frequently isolated bacteria in all age groups. Age group 13-24 months had the highest occurrence of bacteria isolates, followed by 25-36 months; with the least occurrence seen in 0-12 and 49-60 months. Bacterial pathogens were identified in 30.4% of the subjects while 69.5% yielded no bacteria growth. Antibiotics susceptibility test conducted revealed that the isolates were sensitive to Ciprofloxacin and Gentamicin and most of the isolates were resistant to Ceftazidime, Augmentin, Cefuroxime and Ceftriaxone. The high prevalence of E. coli is an indication of poor sanitation and personal hygiene. Efforts should be made to educate the mothers and the guardians in promoting good environmental sanitation and personal hygiene.

Keywords: Diarrhoea, prevalence, watery stool, susceptibility.

Introduction

Diarrhoea is one of the commonest childhood illnesses and remains one of the major causes of infant and childhood morbidity and mortality in developing countries. Diarrhoea is the second leading cause of death in children under five years old and is responsible for the death of about 760,000 children every year. Diarrhoea can be defined as passage of three or more loose watery stools per day or a more frequent than normal for an individual.

Diarrhoea is a symptom of an infection of the intestinal tract, which can be caused by a variety of bacteria, viral and parasitic organisms. Among the causative agents of diarrhoea viruses such as Rotavirus are said to be the commonest, followed by bacteria such as Escherichia coli, Campylobacter jejuni, Salmonella species, Vibrio cholerae, Yersinia enterocolitica and Aeromonas species. These agents of diarrhoea are usually faeco-oral in nature. Diarrhoea is both preventable and treatable. Poor hygiene, sanitation and consumption of contaminated water contribute to easy and frequent acquisition of enteric pathogens. Most patients with acute diarrhoea have three to seven movements of bowel per day with stool volume not less than one litre per day.

Diarrhoea which last for 14 days is regarded as persistent while diarrhoea that last for at least one month is regarded as chronic. Studies in Lagos, Oshogbo, and Minna, have shown E. coli to be responsible for most cases of diarrhoea in children less than five years.
However in Lagos in 1989, *Rota virus* was the pathogen most frequently detected in association with *E.coli*. This study was therefore conducted to determine the common bacteria agents of diarrhoea in children less than five years of age in Ilorin and their antimicrobial susceptibility pattern.

**Methodology**

**Study Area**

This study was carried out in three secondary health centre within Ilorin metropolis and these are Children Specialist Hospital, General Hospital and Adewole cottage Hospital all in Ilorin. The study was a cross sectional study conducted over a period of six months from February 2015 to July 2015. Children with acute diarrhoea aged 0-5years as defined by WHO but not on antibiotics within the last 72hours from time of sample collection were included in the study. Children within the age range with diarrhoea whose parents or guardian do not consent to participate, and willing parents who have commenced antibiotics for their children with in the last 72hours were excluded from the study. Healthy children from nursery and immunization clinic with no diarrhoea infection were also recruited as control. A total of 128 stool specimens of patients with diarrhoea and 100 specimens without diarrhoea were collected during the period of study.

**Sample collection**

A single faecal sample was collected from each child on the same day of patient’s enrolment using wide mouth screw cap sterile containers. The containers were distributed to the mothers and they were taught how to collect the stool samples. This was done for 128 children under 60months old with diarrhoea. The specimens were transported immediately after collection to the microbiology laboratory of the University of Ilorin Teaching Hospital for analysis. Standard questionnaires were used to collect information regarding the risk factors for diarrhoea in the children and the respondents were mothers of eligible children.

**Isolation and identification of isolates**

The samples were examined macroscopically for consistency, colour and some atypical components of stool such as mucus blood and parasites. Red blood cells, ova of parasites and cysts were searched for using the light microscopy. A portion of the stool was aseptically transferred into a sterile enriched broth to study the incidence of bacteria enteric pathogens present in the diarrhoea stool samples. The enriched cultures were transferred to selective and differential agar medium for isolation of different bacteria isolates. Mc Conkey, Deoxycholate Salmonella - shigella and Campylobacter blood-teesellective media were used. The biochemical identification was performed by the motility Iodole urease, catalase, oxidase tests, Simon citrate test and Hippurate hydrolysis test.

**Antibiotics Susceptibility Test**

The susceptibility testing was performed using the Kirby-Bauer disc diffusion method. The results were expressed as susceptible, intermediate and resistant according to the criteria developed by National Committee for Clinical Laboratory Standards (NCCLS,2002). The following antibiotics were used. Ciprofloxacin(5µg), Ceftriaxone(30µg), Ceftaxidime (30µg), Nalidixicacid(30µg), Gentamicin(10µg), Augumentin(30µg) and cefuroxime(30µg). (oxoid product).

**Statistical Analysis**

All data were imputed into the computer. Statistical analysis was performed using the statistical package for the social sciences (SPSS) software version 16.0 and the results were expressed as percentage for the quantitative variables.

**Results**

The result revealed that 39(30.4%) children of the 128 patients examined had diarrhoea. Children under the age group of 13-24 months recorded the highest 10.0% positivity, and children 0-12 and 49-60 months recorded the least 4.0% positivity, table 1.

<table>
<thead>
<tr>
<th>Age in month</th>
<th>No of sample</th>
<th>No positive</th>
<th>%positivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-12</td>
<td>58</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>13-24</td>
<td>44</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>25-36</td>
<td>16</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>37-48</td>
<td>4</td>
<td>7</td>
<td>5.3</td>
</tr>
<tr>
<td>49-60</td>
<td>6</td>
<td>5</td>
<td>4.0</td>
</tr>
<tr>
<td>Total</td>
<td>128</td>
<td>39</td>
<td>30.4%</td>
</tr>
</tbody>
</table>

Of the 128 children recruited for this study, 66(51.6%) were males while 62(48.4%) were females. 22(56.4%)
males were positive for enteric pathogens and 17(43.6%) females were positive for enteric pathogens, table 2.

**Table 2: Gender distribution of Children with diarrhoea**

<table>
<thead>
<tr>
<th>Sex</th>
<th>No and percentage examined</th>
<th>No and % of isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>66(51.6)</td>
<td>22(56.4)</td>
</tr>
<tr>
<td>Female</td>
<td>62(48.4)</td>
<td>17(43.6)</td>
</tr>
<tr>
<td>Total</td>
<td><strong>128(100)</strong></td>
<td><strong>39(100.0)</strong></td>
</tr>
</tbody>
</table>

The following bacteria were isolated in the stool samples, *E. coli* occurred in 53.8%(21/39). The frequency of occurrence of other organisms are

**P. aeruginosa 17.9%, K. pneumoniae 15.4%, P. vulgaris 7.7% and Salmonella and Campylobacter spp with 2.6%** respectively, table 3.

In table 4, the susceptibility pattern of bacteria isolates to some commonly used antibiotics was presented. While a good percentage were intermediate, many were resistant and others much were susceptible.

**Table 3: Percentage distribution of the etiologic agents of diarrhoea**

<table>
<thead>
<tr>
<th>Isolates</th>
<th>Number</th>
<th>Percentage</th>
<th>% of distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>E. coli</em></td>
<td>21</td>
<td>53.8%</td>
<td>16.4%</td>
</tr>
<tr>
<td><em>P. aeruginosa</em></td>
<td>7</td>
<td>17.9%</td>
<td>5.5%</td>
</tr>
<tr>
<td><em>K. pneumoniae</em></td>
<td>6</td>
<td>15.4%</td>
<td>4.7%</td>
</tr>
<tr>
<td><em>P. vulgaris</em></td>
<td>3</td>
<td>7.7%</td>
<td>2.3%</td>
</tr>
<tr>
<td><em>Salmonella</em></td>
<td>1</td>
<td>2.6%</td>
<td>0.7%</td>
</tr>
<tr>
<td><em>C. jejuni</em></td>
<td>1</td>
<td>2.6%</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>100%</td>
<td>30.3%</td>
</tr>
</tbody>
</table>

**Table 4: Antimicrobial Susceptibility pattern of the bacteria Isolates**

<table>
<thead>
<tr>
<th>Organisms</th>
<th>CIP</th>
<th>CAZ</th>
<th>AUG</th>
<th>GEN</th>
<th>CXM</th>
<th>TET</th>
<th>CRO</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>E. coli</em></td>
<td>S-80%</td>
<td>I-5%</td>
<td>S-25%</td>
<td>S-70%</td>
<td>S-65%</td>
<td>S-5%</td>
<td>S-95%</td>
</tr>
<tr>
<td></td>
<td>R-20%</td>
<td>R-95%</td>
<td>I-35%</td>
<td>I-10%</td>
<td>I-25%</td>
<td>R-90%</td>
<td>R-5%</td>
</tr>
<tr>
<td></td>
<td>R-40%</td>
<td>R-20%</td>
<td>R-10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>K. pneumoniae</em></td>
<td>S-70%</td>
<td>R-100%</td>
<td>I-90%</td>
<td>S-50%</td>
<td>R-100%</td>
<td>S-19%</td>
<td>R-100%</td>
</tr>
<tr>
<td></td>
<td>I-30%</td>
<td>R-10%</td>
<td>I-35%</td>
<td>I-4%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R-15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>P. aeruginosa</em></td>
<td>S-100%</td>
<td>R-100%</td>
<td>R-100%</td>
<td>S-67%</td>
<td>R-100%</td>
<td>R-100%</td>
<td>S-15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R-33%</td>
<td>R-100%</td>
<td>R-100%</td>
<td>I-10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R-75%</td>
</tr>
<tr>
<td><em>P. vulgaris</em></td>
<td>S-68%</td>
<td>I-5%</td>
<td>R-100%</td>
<td>S-75%</td>
<td>R-100%</td>
<td>R-100%</td>
<td>I-30%</td>
</tr>
<tr>
<td></td>
<td>R-32%</td>
<td>R-95%</td>
<td>R-25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Salmonella</em></td>
<td>S-75%</td>
<td>I-45%</td>
<td>R-100%</td>
<td>S-64%</td>
<td>R-100%</td>
<td>I-12%</td>
<td>S-20%</td>
</tr>
<tr>
<td><em>typhi</em></td>
<td>I-25%</td>
<td>R-55%</td>
<td>R-100%</td>
<td>I-30%</td>
<td>R-88%</td>
<td>I-30%</td>
<td>R-50%</td>
</tr>
<tr>
<td><em>C. jejuni</em></td>
<td>S-100%</td>
<td>S-100%</td>
<td>S-100%</td>
<td>S-100%</td>
<td>S-100%</td>
<td>S-100%</td>
<td>R-100%</td>
</tr>
</tbody>
</table>

S-sensitive, I-Intermediate, R-resistance,
GEN-Gentamicin, AZ- Cefazidime, CRO-Ceftriaxone, CIP-Ciprofloxacin, CXM-Cefuroxime, TET – Tetracycline, AUG-Augmentin. Ciprofloxacin and Gentamicin are effective against most of the isolates. Ceftriaxone was sensitive only to E. coli. Resistance was seen in most of the organisms to Tetracycline, Augmentin and Cefazidime. Campylobacter was sensitive to all except Ceftriaxone.

Discussion

Infectious diarrhoea is a major health problem in developing countries. Diarrhoea has been frequently observed in children below 2years of age as compared to other age groups10. This study established the prevalence and susceptibility pattern of bacteria pathogens in stool of children less than five years of age presenting with diarrhoea. The prevalence of bacteria associated diarrhoea in this study was 23.2%. This finding is similar to an earlier work by Ifeanyi et al11 in Abuja who reported 22.4% prevalence and at variance with 53.4% reported by Okolo et al 12. Abdullahi et al 13 reported 40.67% prevalence in Kano and Olowe et al 7 reported a prevalence of 57.0% in Oshogbo. This change in the prevalence of these similar studies can be attributed to seasonal variations when these studies were carried out, because poor hygiene, sanitation and consumption of contaminated water all contribute to easy and frequent acquisition of enteric pathogens. The frequency of diarrhoea was more in the age group 13-24months while age group 0-12 and 49-60months recorded the least possibility of pathogens in the stool, which suggests an association between age and bacteriadiarrhoea. The reason for high incidence of bacteria isolates in 13-24months is that they are at oral stage of life. They pick virtually anything into their mouth and they cannot differentiate what not to put into their mouth at this age. The least frequency in the age group 49-60months is similar to findings in other studies11, 14,15. In these age group, there is the less tendency to put objects into their mouths hence the less incidence of diarrhoea at this age group.

The study also shows the preponderance of bacterial pathogens of diarrhoea in the males 56.4% as against the 43.6% obtained in females. This finding is at variance with the outcome of the study by Okolo et al12 where female children were more affected than male children. Males are known to be more active than females and are more exposed to risk factors that could precipitate diarrhoea.

Six bacteria species (E. coli, P. aeruginosa, K. pneumoniae, P. vulgaris, Salmonella typhi and Campylobacter jejuni) were isolated from the stools of these children that presented with diarrhoea. E. coli, Pseudomonas and K. pneumoniae were isolated at a high rate but E.coli being the predominant. This is similar to the findings of Ifeanyi et al 11, Celine et al15, Galadima et al 8, Olowe et al 7 and Ajero et al17. Bacteria pathogen was identified in 30.4% of the subjects while 69.5% yielded no bacterial growth and this is a pointer that other agents might be responsible for the diarrhoea seen in the children. Other notable agents of diarrhoea in this study are P. aeruginosa and K. Pneumoniae. The only Campylobacter isolates was seen in a baby less than two years old with watery diarrhoea.

The assessment of the susceptibility pattern showed varied sensitivities. Majority of the isolates were sensitive to Ciprofloxacin and Gentamicin and most of the isolates were found to be resistant to Cefazidime, Augmentin and Ceftriaxone and Cefuroxime. Campylobacter shows a remarkable sensitivity to all the antibiotics except Ceftriaxone. In this study, some of the isolates were resistant to more than one drugs, hence, they are multidrugresistant17,18,19.

Conclusion

This study has shown Escherichia coli as the commonest cause of diarrhoea in children less than five years of age in Ilorin metropolis, and the isolates were sensitive to ciprofloxacin and gentamicin, other isolates were sensitive to ciprofloxacin and gentamicin and these two drugs can be used in the treatments of infantile diarrhoea in Ilorin metropolis except that ciprofloxacin is contraindicated in children because of its side effects. The high prevalence of E. coli and other isolates is an indication of poor sanitation and poor personal hygiene because they are faeco oral by their nature of transmission. Effort should be made to educate the mothers and the guardian on ways to combat this infantile diarrhoea by the promotion of good environmental sanitation and personal hygiene. Studies on other causative agents of diarrhoea in the study area should be investigated.

References

Effects of acute consumption of *garcinia kola* on hepatic enzymes in apparently well Nigerian youths.

BiliaminuSA¹, AbdulAzeezIM¹, ShittuRO², AjaniS³

1. Department of Chemical Pathology and Immunology, University of Ilorin, Ilorin, Kwara State; Nigeria.
2. Department of Family Medicine, University of Ilorin Teaching Hospital, Ilorin, Kwara State; Nigeria.
3. Department of Basic Medical Sciences, College of Health Sciences, University of Ilorin, Kwara State; Nigeria.

**Abstract**

**Introduction**: *Garcinia kola* belongs to the Family Clusiaceae guttiferae and contains a complex mixture of biflavonoids, prenylated benzophenones and xanthone¹. Its seeds, popularly called 'Bitter Kola', form an integral part of the herbal preparations used in traditional African medicine. A lot of studies have been done in animals to look at the effects of *Garcinia kola* on their organs, very few have been done in human beings.

**Objective**: This study was done to look at the effect of acute consumption of *Garcinia kola* on hepatic enzymes in apparently well Nigerian youths.

**Methodology**: The response of aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP) following the consumption of about 100 mg/kg of body weight of *Garcinia kola* was measured in 28 apparently well University of Ilorin medical students. The rise in the level of AST, ALT and ALP was studied from the plasma of the subjects. The basal level of the enzymes pre-consumption of *Garcinia kola* serves as control for the ones collected after 2 hours of *Garcinia kola* consumption.

**Results**: After consumption of *Garcinia kola*, the result shows that the level of AST rose from 90.6 ± 43.6 u/L to 120.9 ± 42.6 u/L which was significant at p=0.001, the level of ALT rose from 63.4 ± 56.3 u/L to 86.8 ± 51.6 u/L which was significant at p=0.001, and the ALP level rose from 101.1 ± 75.4 u/L to 139.5 ± 89.9 u/L which was significant at p=0.001. The De-Ritis ratio was calculated and was found to decreased from 7.3 ± 1.81 to 1.8 ± 1.0 which was significant at p<0.041 respectively. Pre-consumption of *Garcinia kola*, there was a weak negative correlation between AST and ALT at ‘r’ value of -0.310 and ‘p’ value of 0.108; so also between AST and ALP at ‘r’ value of -0.310 and ‘p’ value of 0.018 but positive correlation between ALT & ALP at ‘r’ value of 0.425 and ‘p’ value 0.024. Post-consumption of *Garcinia kola*, there was a stronger but still weak negative correlation between AST and ALT at ‘r’ value of -0.515 and ‘p’ value of 0.442; but positive one between AST and ALP at ‘r’ value of 0.205 and ‘p’ value of 0.296 but positive correlation between ALT and ALP at ‘r’ value of 0.321 and ‘p’ value 0.096.

**Conclusion**: The clinical significance of this study is that following the acute consumption of *Garcinia kola*, there was an increase in the plasma levels of AST, ALT and ALP, and a decrease in the calculated De-Ritis ratio. This shows that *Garcinia kola* is a hepatic enzymes inducer.

**Recommendation**: Therefore, extra care should be taken when interpreting the results of hepatic enzymes in habitual consumers of *Garcinia kola*. Also, those consuming it should take it with caution, or take it only when it is absolutely indicated in as much as its mechanism of induction is not known for now.

**Key words**: Acute Consumption, *Garcinia kola*, Hepatic Enzymes, Nigerian Youths.

**Introduction**

Early men were said to have gained some scientific knowledge by watching the effects produced by various plants when eaten by domestic animals. It is from this that they were able to arrive at dosages. The demand for the therapeutic drugs from natural products is on the increase in recent times. This is traceable to possible realization that plant products contain active constituents that are capable of curing majority of man’s diseases. It is observed that drugs of natural origin are the only widely used hepatoprotectives².

*Garcinia kola* belongs to the family Clusiaceae guttiferae and contains a complex mixture of biflavonoids, prenylated benzophenones and xanthone¹. Its seeds, popularly called ‘Bitter Kola’, form an integral part of the herbal preparations used in traditional African medicine. A lot of studies have been done in animals to look at the effects of *Garcinia kola* on their organs, very few have been done in human beings. Corresponding Author: SA Biliaminu. Department of Chemical Pathology and Immunology, University of Ilorin, PMB 1459, Ilorin, Kwara State, Nigeria. e-mail address: sbiliaminu@gmail.com
part of the herbal preparations used in traditional African medicine. It has been confirmed to have anti-inflammatory, antimicrobial, pharmacological and antiviral properties. The seeds of Garcinia kola have been employed in many herbal preparations in Nigeria for the treatment of ailments ranging from laryngitis, bronchitis to liver disorders.

It is a popular agricultural produce available in large quantity in West Africa particularly in Nigeria and it is a tree that grows in the rain forests. It is found in the tropical rain region and given different names in Nigeria. It is known as Orogbo in Yoruba land, Namijin-goro among Hausa, and Akulul in Igbo land. Like the kola nut, it is produced from a big tree however it is a monocotyledon. Although it is eaten widely for different purposes, it has nothing to do with the tradition of any known ethnic group. It has been identified as a potent antibiotic which could be effective in the treatment of many diseases. The fruit, seeds, nuts and bark of the plant have been used for centuries in folk medicine to treat ailments from coughs to fever. In the International market however, it is known as Garcinia kola which symbolizes its botanical name and it is used extensively in the preparation of herbal drugs either as stimulant supplement or as herbal remedies as well. As with any other herbs, you never consume Garcinia kola without first discussing its use and benefits with your physician, especially if you are currently being treated for other medical conditions or are on any medications. This had been the reasons for a nonstop demand for it and because, any products that have to do with human health will surely and always enjoy good patronage.

It is considered as an effective agricultural produce in the treatment of cough, diarrhea, tuberculosis and other bacterial infections. "When food is suspected to be contaminated by bacteria, chew bitter kola immediately after eating, it will prevent the development of any infection or poisoning. It is eaten mostly by the elderly people because of their belief that it could prolong life. Researches done by scientists have revealed that Garcinia kola contains chemical compounds that will help the breakdown of glycogen in the liver and has other medicinal uses which account for its longevity property in man. The Garcinia kola extract exhibited dose-dependent antispasmodic effects on contractions induced by acetylcholine, and dose-dependent spasmodic effects on spasms of small intestine.

Talking about the Chemistry of Garcinia kola, its extract gave the highest concentration of crude saponin when compared with the extract of other part of the plant. Alkaloids could not be detected in methanol and water extracts of the pulp and root. Neither was there any trace of alkaloid detected in the methanol extract of all the remaining part of the plant (seed, stem, leaves, and bark). However, there seemed to be a high concentration of alkaloidal substances in the water extract of the seed and stem. Other chemical components Garcinia kola are: Tannis which were detected only in the methanol extract of the seed, stem, leaves and bark. Phlobatannin was detected in the methanol extract of all the part of the plant except the pulp. All the extract of the various part of the plant responded negatively to the test for free anthroquinone, and this suggests that the plant was probably devoid of any anthroquinone. It is also confirmed that seeds of Garcinia kola contain energy-yielding nutrients (proteins, lipids, carbohydrates) and minute quantities of Kolvirone (consisting of biflavonoids GB-1, GB-2 and Kolaflavone, but lacks caffeine).

Despite the widespread increase in the rate of consumption of Garcinia kola in Nigeria not only among the elderly but even the youths for various reasons and purpose, very few literature are available on its biochemical effect on the liver. Hence, we thought it will be wise to have a look at the effect on the hepatic enzymes of youths involved acute consumption of Garcinia kola.

Aims and objectives

The aim of this study was to determine the effects Garcinia kola on the hepatic enzymes (aminotransferases {AST and ALT} and alkaline phosphatase {ALP}). The specific objectives were to determine plasma activities of AST, ALT and ALP both pre-and post consumption of Garcinia kola in apparently well Nigerian youths. De-Ritis ratio was determined from the AST and ALT plasma level.

Materials and Method

The subjects for this study comprised of 28 healthy University of Ilorin medical students (14 males and 14
females) by random selection method. Their age ranges from 19 to 28 years. The *Garcinia kola* seeds used for this project were gotten from a *Garcinia kola* vendor at Baboko market in Ilorin, who got it from the same source. Criteria for Selection of Subjects

The following criteria were satisfied by each of the students before being accepted as a subject of the study:

- The well-being of the students was ascertained.
- Availability and ability to co-operate adequately throughout the duration of the study.
- No history of liver diseases.
- No form of inflammatory disorders.

Experimental Procedure

The age and sex of the subjects were recorded. All the tests were performed with the subjects comfortably seated. 3 mls of blood was collected from each of the subject by venepuncture using a needle and syringe and needle, and gently poured into the plain bottle. These serve as the control samples (i.e before eating the *Garcinia kola*).

The subjects were then given 100 mg/kg of body weight of *Garcinia kola* to eat. After 2 hours, 3 mls of blood was collected and gently poured into the plain bottle. The plasma obtained before and after the consumption of *Garcinia kola* was then taken to the laboratory to analyze the levels of AST, ALT and ALP in each of the plasma samples collected.

Measurement of the analytes

**Measurement Principle for AST**

$\alpha$-ketoglutarate + L-Lactate $\rightarrow$ L-Glutamate + Oxaloacetate

NOTE: the reaction is catalyzed by AST.

The increase in oxaloacetate was an indicator reaction catalyzed by Malate dehydrogenase (MDH).

Oxaloacetate + NADH + H$^+$ $\rightarrow$ L-Malate + NAD$^+$

NOTE: the reaction is catalyzed by MDH.

NADH is oxidized to NAD. The rate of the NADH decrease is directly proportional to the rate of formation of oxaloacetate and thus the AST activity.

**Measurement of ALT**

$\alpha$-ketoglutarate + L-Lactate $\rightarrow$ L-Glutamate + Pyruvate

NOTE: ALT catalyzes the reaction.

The increase in pyruvate is determined in an indicator reaction catalyzed by lactate dehydrogenase (LDH).

Pyruvate + NADH + H$^+$ $\rightarrow$ L-Lactate + NAD$^+$

(NOTE: LDH catalyzes the reaction)

NADH is oxidized to NAD. The rate of the NADH decrease is directly proportional to the rate of pyruvate and thus the ALT activity.

**Measurement of ALP**

**Measurement Principle**

P-Nitro-phenyl phosphate + H$^+$ $\rightarrow$ p-Nitrophenolate + Phosphate

NOTE: AP catalyzes the reaction

The p-Nitrophenol is present as yellow coloured p-Nitrophenolate. The increase of absorbance per minute at 450nm is proportional to the enzyme activity.

De Ritis Ratio is AST/ALT ratio and is more sensitive in most phases of hepatic disease.

At the end of all measurement, each subject’s age and sex were recorded. The level of AST, ALT, ALP and De-Ritis ratio in the plasma before and 2 hours after consumption of *Garcinia kola* was recorded.

All analysis was done using SPSS (Statistical Package for Social Science Students) version 20. The mean of the subjects AST, ALT, ALP and De-Ritis ratio levels before and after consumption of *Garcinia kola* was also calculated and recorded as ± standard error of mean. While the students t-test was used to determined the difference between the means, p-values less than 0.05 (p≤0.05) were taken as statistically significant.

**Results**

The results below show the effect of *Garcinia kola* on Hepatic Enzymes and De-Ritis ratio before and 2 hours after consumption of the *Garcinia kola* which was studied in twenty-eight (28) apparently well Nigerian youths.
Table 1: Showing the descriptive variables of the parameters before and after *Garcinia kola* consumption

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean±SD (Pre-consumption of <em>G. kola</em>)</th>
<th>Mean±SD (Post-consumption of <em>G. kola</em>)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST</td>
<td>90.6±43.6 u/l</td>
<td>120.9±42.6 u/l</td>
<td>0.001</td>
</tr>
<tr>
<td>ALT</td>
<td>63.4±56.3 u/l</td>
<td>86.8±51.6 u/l</td>
<td>0.001</td>
</tr>
<tr>
<td>ALP</td>
<td>101.1±75.4 u/l</td>
<td>139.5±89.5 u/l</td>
<td>0.001</td>
</tr>
<tr>
<td>DE-RITIS Ratio</td>
<td>7.3±1.81</td>
<td>1.8±1.0</td>
<td>0.041</td>
</tr>
</tbody>
</table>

The result shows that the level of AST rose from 90.6 ± 43.6 u/l to 120.9 ± 42.6 u/l, the level of ALT rose from 63.4 ± 56.3 u/l to 86.8 ± 51.6 u/l, the ALP level rose from 101.1 ± 75.4 u/l to 139.5 ± 89.9 u/l, and the De-Ritis ratio decreases from 7.3 ± 1.81 to 1.8 ± 1.0 respectively. The rise in AST, ALT and ALP levels, and the decrease in the De-Ritis ratio induced by consumption of *Garcinia kola* was significant at p <0.05.

Table 4: Showing Correlation studies between the hepatic enzymes after *Garcinia kola* consumption

<table>
<thead>
<tr>
<th>Parameters</th>
<th>'r' value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST vs ALT</td>
<td>-0.151</td>
<td>0.442</td>
</tr>
<tr>
<td>ALT vs ALP</td>
<td>0.321</td>
<td>0.096</td>
</tr>
<tr>
<td>AST vs ALP</td>
<td>0.205</td>
<td>0.296</td>
</tr>
</tbody>
</table>

The above table shows that there was negative correlation between AST and ALT, and positive correlation between ALT and ALP as well as AST and ALP respectively.

Table 2: Showing Correlation studies between the hepatic enzymes before *Garcinia kola* consumption

<table>
<thead>
<tr>
<th>Parameters</th>
<th>'r' value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST vs ALT</td>
<td>-0.310</td>
<td>0.108</td>
</tr>
<tr>
<td>ALT vs ALP</td>
<td>0.425</td>
<td>0.024</td>
</tr>
<tr>
<td>AST vs ALP</td>
<td>-0.310</td>
<td>0.018</td>
</tr>
</tbody>
</table>

The table above shows that there was a negative correlation between AST & ALT and AST & ALP, but positive correlation between ALT & ALP respectively.

Table 3: Showing Correlation studies between the hepatic enzymes and De-Ritis ratio after *Garcinia kola* consumption

<table>
<thead>
<tr>
<th>Parameters</th>
<th>'r' value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST vs De-Ritis Ratio</td>
<td>-0.094</td>
<td>0.634</td>
</tr>
<tr>
<td>ALT vs De-Ritis Ratio</td>
<td>-0.382</td>
<td>0.045</td>
</tr>
<tr>
<td>ALP vs De-Ritis Ratio</td>
<td>-0.101</td>
<td>0.609</td>
</tr>
</tbody>
</table>

The above table shows that there was negative correlation between the hepatic enzymes and the De-Ritis ratio.
Discussion

In hepatocytes, 20% of AST is cytosolic, and 80% of AST is in the mitochondria. ALT is primarily found in the cytosol of hepatocytes and is also found in the mitochondria (ALT is more liver specific than AST). And a large percentage of ALT is found in the biliary canaliculi (an elevation of which is suggestive of biliary canaliculi dilatation, which is beneficial in patients with biliary obstruction). ALP is mostly found in the hepatobiliary portion of the liver.

This studies shows that *Garcinia kola* has potent effects on increasing the hepatic enzymes and decreasing De-Ritis ratio in human serum. Obviously, the elevated levels of these hepatic enzymes are a direct reflection of alterations in the hepatic structural integrity or induction of the hepatic enzymes production.

The decrease in the De-Ritis ratio post *Garcinia kola* consumption means that the rise in ALT level is higher than the equivalent rise in the AST level after *Garcinia kola* consumption (since De-Ritis ratio=AST/ALT). The reasons for this rise could be that: {a} *Garcinia kola* causes higher alteration in the genes coding for ALT than that of AST, (b) ALT is a better biomarker of hepatic damage than AST [since it is more liver specific than AST], or (c) there is higher mitochondria leakage of ALT than AST. This possible higher mitochondrial leakage might be due to differential variation in molecular masses of ALT and AST. If this is the case, then it is more likely that ALT is smaller in weight than AST.

Post consumption of *Garcinia kola*, it was noticed that the negative correlation between AST and ALT changes from negative to positive. However, there was a consistent maintenance of the negative correlation of the three hepatic enzymes and the De-Ritis ratio. Although, the values varied.

Cross-referencing is a bit more difficult as most studies done relating to hepatoprotective effects of *Garcinia kola* as well as hepatic biomarkers were mostly in animals than man. More so, most of them were based on toxicological studies.

In conclusion, consumption of *Garciniakola* increases hepatic enzymes in humans, which indicates that *Garciniakola* is a hepatic enzymes’ inducer as shown by an increase in the plasma levels of AST, ALT and ALP, and subsequent decrease in the calculated De-Ritis ratio. Therefore, extra care should be taken when interpreting the results of hepatic enzymes in habitual consumers of *Garciniakola*. Also, those consuming it should take it with caution, or take it only when it is absolutely indicated. It is also recommended that more studies of effects of *Garcinia kola* should be ventured into using humans at molecular level.

References

Health related quality of life of the elderly in a Peri-Urban Community in South-South Nigeria

Asogun AD¹, Ochei O¹, Momoh J¹, Okakah F¹, Omorogbe O², Oshomah F².

¹Department of Community Medicine, Irrua Specialist Teaching Hospital, Irrua, Edo State.
²Department of Community Medicine, Ambrose Alli University, Ekpoma, Edo State.

Abstract

Background: As there is a global increase in the population of the elderly in both absolute number and as a proportion of the total population, there is also a corresponding need to evaluate the quality of life and health problems of the elderly especially in developing nations. There is an apparent little or no attention to the wellbeing of the elderly in these countries.

Objective: This study was therefore designed to determine the health problems and also the health related quality of life of the elderly who reside in Esan West Local government area of Edo State, Nigeria.

Methodology: By means of an interviewer administered structured questionnaire in a cross-sectional study design, 249 elderly persons aged 65 years and above who reside in Ekpoma, Esan West Local government area of Edo State, Nigeria were selected through cluster sampling technique. Their socio-demographic characteristics, medical/social problems and income were elicited using a questionnaire coined from parameters in the old peoples’ questionnaire on quality of life (OPQOL). Data was analysed using SPSS version 21. Multiple linear regression model was used to predict the impact of the independent variables on quality of life.

Results: The ages ranged from 65 – 130 years with a mean age of 75.4±10.37, with majority of the respondents (58.4%) within 65-74 years, female (57.6%), married (48.0%) and no formal education (33.2%). Reported chronic diseases were hypertension (28.4%), diabetes (12.8%), arthritis (26.8%), eye problems (31.8%) while 5.6% had dementia. Most (76.4%) were lonely and 40.4% had severe financial constraints. The mean quality of life scores was 77.5% in all domains. There was a relationship between the age, marital status, education, income, presence of chronic diseases and quality of life (p < 0.05). The older elderly, the married, those with higher education, regular income and those with no chronic disease had better QOL scores. Presences of chronic and regular income were the conclusive predictors of quality of life.

Conclusion: Quality of life decreases with poor physical health and low income in the Nigerian elderly. Poor quality of life and well-being, and health status in older people are significantly related to marital status, sex and age. Thus, the quality of life is still a major concern for the elderly population and a clear public health challenge requiring immediate intervention.

Recommendation: It is therefore recommended that a national policy on ageing be put in place that will comprehensively address their peculiar needs including provision of social welfare services like subsidized medical expenses and subsistence allowance.

Introduction

Longevity and good quality of life at old age are the longing and anticipation of man. However, old age in our society seem to present individuals with numerous challenges and stressors; most of which are either medical, mental, emotional, social or economic in nature or a combination of these.¹ In most countries of the world, ageing is often associated with degenerative disorders resulting in poorer health, increased suffering, reduced productivity and probably poor quality of life.² Empirical evidence from a study conducted in Kenya; a developing country in west Africa, shows that about 92.5% of the elderly were said to be sick, with about 45% of them having more than two ailments.³ The report from similar study carried out in the United States in 2015, revealed that 67% of people over 65 years lived with two of more chronic diseases and care of the elderly accounts for 66% of American health expenditure.⁴ Despite this reports, the sufferings of the elderly can be minimized by developing favorable health policies to

---

Corresponding Author

Ochei O
Department of Community Medicine,
Irrua Specialist Teaching Hospital, Irrua, Edo State.
E-mail: dratarer@yahoo.com
improve their living conditions through research based findings.

Studies to assess the health problems of the elderly and quality of life are on the upturn in developed nations. Also, many governments in developed countries, have designed programs, packages, schemes, safe and supportive environment to enhance satisfaction in these aged group owing to the increase life expectancy. WHO projected that 60% of the world in the year 2050 would be dominated by older people, of which majority will be living in rural communities with shoddier resources. Unfortunately, in Nigeria, just like in many developing countries, few scientific evidence are available on the quality of life and the various health challenges faced by the elderly, as a result, the medical experts, health managers may not have the least evidence on the health burden of the elderly and the society at large are not aware of the many problems and sufferings faced by the elderly.

Medical problems that are common amongst the elderly may interact with other inherent determinants in the environment such as income, housing factors and availability of social amenities subsequently reduced their quality of life. Revicki and colleagues define QOL as "a broad range of human experiences related to one's life satisfaction and overall wellbeing.(ref) Quality of life has both subjective and multidimensional aspect and was addressed in many studies either as general quality of life or health related quality of life. 3678 The former is broad based form that includes the sense of well-being and happiness regardless of illness and dysfunctions. It takes into consideration the degree of pleasure derived in daily chores, positive attitude towards life, amount of fulfillment in personal achievements, mood tone, the degree of personal self-regard, financial security and time spent with people. 89 Health related quality of life measures individual satisfaction in the following basic domains; functionalities, emotional, social and overall wellbeing, that are more clearly related to symptoms, disabilities and limitation caused by disease. 810

Without research in developing countries, there would be no generation of empirical data on the health challenges of the elderly and their quality of life. With this in view, this research examines the presence or absence of some chronic diseases (Hypertension, Diabetic Mellitus, Arthritis, eye disorders and dementia) and quality of life in the elderly. The study will also determine the relationship between participant’s characteristics and quality of life. This will create awareness on their quandaries in our immediate environment. Also, credible data on the burden of common health problems in the elderly, are needful, in the provision of health care services, so that care is adapted to the facts rather on baseless assertions. The outcome of this study could be used for comparison in future research.

Materials and Methods

Study area
The study area was Ekpoma, a town in Esan West local government Area of Edo State, Nigeria and the home of Edo State University. The area lies between latitude 60 40’N 60 45’N and longitude 60 05’E 60 10’E. It has a population of over 500,000 people and occupies a landmass of 483.29km². The major communities within Ekpoma include Ujemen, Iruekpen, Ihumudumu, Ujoelen, Eguare, Emaudo, Illeh, Eke, Uhiele, Ukpenu, Igor, Igboro and Idumebo. Indigenes speak Esan and mainly a residential and commercial area; the major occupation among them is farming, trading and artisan. There were 4,598,114 (5.2%) persons aged 60+ (the elderly) in Nigeria in 1991 of the national population of 88,992,200. The number of the elderly is projected to have increased to around 5 million by the year 2000 (NPC, 1998: 414) 11.

Subject selection
The study was a cross-sectional study conducted from January-March 2016. The minimum sample size for this study was 249, calculated using the formula for cross sectional study. Three communities: Illeh, Eguare and Emaudo were drawn by simple random sampling from the list of all the communities in Ekpoma. Each selected community was taken as a cluster and persons 65 years and above present at the time of the study was approached to participate in the study; information was only obtained from consenting individuals.

Data Collection instrument
Quantitative tool (interviewer administered questionnaires) coined from parameters in the old people questionnaire on quality of life OPQOL was used to assessed quality of life12. In addition, the socio-demographic characteristics, medical/social problems, domestic and financial sources were also obtained by asking relevant questions. Interviewers were trained on
questionnaire administration and the questions were interpreted in pidgin English and Esan dialect.

**Data Management**

Medical problems were measured in terms of presences or absences of chronic diseases such as hypertension, diabetes mellitus, arthritis, eye disorders. Social problems were measured in terms of loneliness, depression, difficulty relating to others and finances. Twenty-eight items were used to assessed quality of life in the in the following domains: life overall (4 items), health (4 items), social relationship (5 items), psychological and emotional well-being (4 items) and financial satisfaction (4 items). Each item had 5-points likert scale from strongly agreed to strongly disagreed. The scale was scored with reversed coding of positive response; strongly agreed having a higher score of 5 while strongly disagreed had a score of 1. The raw (total) score ranges from 21-105 with higher score equals higher quality of life. The total scores for the five domains were also calculated, ranging from 4 to 16, except the social relationship domain that ranges from 5-20. The next step consists of transforming each raw scale score to a 0-100 scale using the U. S. WHO Quality of Life scoring system. The formula is shown below:

\[
\text{TransformedScale} = \frac{\text{Actualrawscore} - \text{lowestpossiblescore}}{\text{possiblerawscorerange}} \times 100
\]

where “Actual raw score” is the respondents total score, “lowest possible raw score” is the lowest possible value that could occur through summation (this value would be 21), and “possible raw score range” is the difference between the maximum possible raw score and the lowest possible raw score (this value would be 105 minus 21 equals 84). The scores from each domain were also transformed using the formula above. This transformation converts the lowest and highest possible scores to 0 and 100, respectively. Scores between those values represent the percentage of the total possible score achieved.

**Data analysis**

Data collected were analyzed using the statistical package for social sciences (SPSS) version 21. The independent variables; socio demographic characteristics, financial support, domestic support and presences of chronic diseases were measured as categorical variables. The depended variable; quality of life scores was measured as quantitative discrete variable (0-100%). The relationship between socio demographic characteristics, financial/domestic support and quality of life were tested using N-way ANOVA. The mean, confidence interval and standard error were derived for each domain of the quality of life scale. Multiple linear regression model was used to predict the impact of the independent variables on quality of life (dependent variables).

**Ethical Consideration**

The research was approved by the ethical committee of Irrua Specialist Teaching Hospital, Irrua. Informed consent was obtained after indicating the purpose of the research and reassuring confidentiality of any information to be obtained.

**Result**

The ages ranged from 65 – 130 years with a mean age of 75.4±10.37, with majority of the respondents (58.4%) within 65-74 years. Female respondents (57.6%) are more than male respondents (42.4%). Forty-eight percent of respondents were married while 46% were widows/widowers. About one-third (33.2%) had no formal education, while 20.4%, 20.8% and 25.6% had primary, secondary and tertiary level of education respectively. Thirty-five percent were retired, 29.2% were farmers and 24.4% were traders. About 36.8% of the respondents had at least one chronic diseases of which 28.4% of the respondents said they had hypertension, 12.8% said they are diabetic, 26.8% had arthritis, 31.8% had eye problems while 5.6% were had dementia. Other medical problems observed among the respondents include: low back pain, heat and moving sensation in the head, malaria etc. These were present in 22.4% of the respondents.

**Table 1: socio-demographic characteristic of respondents.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (n=250)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65 – 74 years</td>
<td>146</td>
<td>58.4</td>
</tr>
<tr>
<td>75 – 84 years</td>
<td>56</td>
<td>22.4</td>
</tr>
<tr>
<td>85 – 94 years</td>
<td>36</td>
<td>14.4</td>
</tr>
<tr>
<td>≥95 years</td>
<td>12</td>
<td>4.8</td>
</tr>
</tbody>
</table>
Sex
Males 106 42.4
Females 144 57.6

Marital Status
Single 3 1.2
Married 120 48.0
Divorced 42 16.8
Widow/Widower 115 46.0

Ethnicity
Esan 201 80.4
Bini 13 5.2
Etsako 10 4.0
Others (Owan, Ibos, Yoruba, Efik and Igbira). 26 10.4

Religion
Christianity 231 92.4
Islam 13 5.2
Others 6 2.4

Level of Education
No formal education 83 33.2
Primary Education 51 20.4
Secondary Education 52 20.8
Tertiary Education 64 25.6

Occupation
Retired 89 35.6
Farming 73 29.2
Trading/In business 61 24.4
Civil servants 16 6.4
Artisans 3 1.2
Others 8 3.2

Had care givers
Yes 197 78.8
No 53 21.2

Has regular income
Yes 194 77.6
No 56 23.4

Does this income sustain you?
Yes 146 58.4
No 104 41.6

Sources of income
Working 59 23.6
Pension 23 9.2
Children 73 29.2
Children, friends and relatives 95 38.0

Table 2: Medical and social problems of respondents

<table>
<thead>
<tr>
<th>PROBLEMS OF RESPONDENTS</th>
<th>Frequency (n=250)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Problems of Respondents</td>
<td>*Presences of chronic disease</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>158</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>Yes</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>179</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>Yes</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>218</td>
</tr>
<tr>
<td>Arthritis</td>
<td>Yes</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>183</td>
</tr>
<tr>
<td>Eye Problems</td>
<td>Yes</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>173</td>
</tr>
<tr>
<td>Dementia</td>
<td>Yes</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>236</td>
</tr>
</tbody>
</table>

Others (Back pain, Malaria, Heat in the head etc) 56 22.4

Social PROBLEMS OF RESPONDENTS

Loneliness
Lonely 191 76.4
Not lonely 59 23.6

Have Difficulty relating with others
Yes 175 70.0
No 75 30.0

Depression
Depressed 20 8.0
Not depressed 230 92.0

Financial Constraint
Severely constrained 101 40.4
Not severely constrained 149 59.6

*Had at least one chronic disorder.

It was observed that most (76.4%) of the elderly respondents were lonely, 70.0% had difficulty relating with others and (8.0%) were depressed. About 59.6% had adequate income while 40.4% had severe financial constraints. The majority of respondents are currently not on any paid job (29.2%) get their income from children, (9.2%) from pensions, (33.6%) gets money from several people-children, relatives and friends. Only (23.6%) are still working. The majority (78.8%) respondents were being helped domestically by caregivers (children, relatives, house help and grandchildren). The mean quality of life scores was 77.5% in all domains. The least score was recorded...
in the following facets: health (64%) social (58.9%) and finances (62.2%) 

Table 3: Mean score of quality of life of respondents

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>95%CI</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life overall</td>
<td>76.5%</td>
<td>(74.58-78.42)</td>
<td>0.98</td>
</tr>
<tr>
<td>Health and functioning</td>
<td>64.6%</td>
<td>(62.05-67.21)</td>
<td>0.32</td>
</tr>
<tr>
<td>Social relationship</td>
<td>58.9%</td>
<td>(57.66-60.18)</td>
<td>0.65</td>
</tr>
<tr>
<td>Psychological and emotional well-being</td>
<td>77.7%</td>
<td>(76.00-79.37)</td>
<td>0.86</td>
</tr>
<tr>
<td>Financial circumstances</td>
<td>62.2%</td>
<td>(61.74-62.62)</td>
<td>0.22</td>
</tr>
<tr>
<td>Aggregate score</td>
<td>77.5%</td>
<td>(76.23-78.62)</td>
<td>0.60</td>
</tr>
</tbody>
</table>

There was relationship between the variable age, marital status, education, income, presence of chronic diseases and quality of life \( p < 0.05 \). The older elderly, had poorer quality of life scores (75%) compared to the younger elderly (79%). The married and singles had better quality of life scores than divorces and windows/widowers. Respondents with higher education had better scores (80%) than those with lower education (74%). Those with presences of at least one chronic ailments had worse quality of life scores (70%) than those with no chronic diseases (79%). Those with regular income had better scores (79%) than those with irregular income (73%). Presences of chronic and regular income were the conclusive predictors of quality of life.

Table 5: Multiple linear regression of quality of life and socio-demographic characteristics

<table>
<thead>
<tr>
<th>Model</th>
<th>( \beta ) unstandardized</th>
<th>( \beta ) standardized</th>
<th>T</th>
<th>p-value</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>77.861</td>
<td></td>
<td>13.859</td>
<td>0.0001</td>
<td>66.794-88.927</td>
</tr>
<tr>
<td>Presences of Chronic Diseases</td>
<td>7.912</td>
<td>0.362</td>
<td>6.371</td>
<td>0.0001</td>
<td>5.466-10.359</td>
</tr>
<tr>
<td>Has regular income</td>
<td>-5.239</td>
<td>-0.233</td>
<td>-4.224</td>
<td>0.0001</td>
<td>-7.682-2.796</td>
</tr>
<tr>
<td>Marital Status</td>
<td>-0.675</td>
<td>-0.071</td>
<td>-1.123</td>
<td>0.262</td>
<td>-1.858-0.508</td>
</tr>
<tr>
<td>Level of Education</td>
<td>-0.635</td>
<td>0.080</td>
<td>1.249</td>
<td>0.213</td>
<td>-0.366-1.637</td>
</tr>
<tr>
<td>Age</td>
<td>-0.090</td>
<td>0.099</td>
<td>-1.643</td>
<td>0.102</td>
<td>-0.197—0.018</td>
</tr>
</tbody>
</table>

\( F=17.59 \ (P=0.0001); \ df_1=5, \ df_2=244; \ adj \ R^2=0.265 \ *CI \) means confidence interval

Discussion

As the world population ages and people live longer, it is becoming increasingly important to ensure that older people enjoy a good quality of life and experience a positive well-being.15 This is the ultimate goal of this venture which has started with this study aimed at determining the quality of life of the elderly as it relates to health in a developing nation like Nigeria. In this study, the ages of the respondents ranged from 65
– 130 years with a mean of 75.4 ± 10.37 and 41.6% were above 75 years old. Compared to previous statistics, this is indicative of a gradual increase in the number of persons entering the old age brackets. It is similar to the finding in a study carried out in South Korea, where the mean age was 73.2 ± 5.5. This is a wake-up call for the concerned arm of government like the social welfare services to be more proactive in the planning and policy formulations relating to the elderly. There is obvious need to expand existing services and to start where there is presently none. Female respondents (57.6%) were more than male respondents (42.4%). This is in consonance with the literature that the women tend to do better and live longer in the latter years of life. About one-third (33.2%) of the respondents had no formal education. Education is an asset which enables one to know and appreciate better societal dynamics and potentiates ability to enjoy life. The main physical health problems were chronic ailments which include hypertension (28.4%), diabetes (12.8%), arthritis (26.8%), eye problems (31.8%) while 5.6% had dementia. These ailments which are not uncommon in the elderly is similarly reported by Kimm et al (2012) who found chronic diseases in 35.1% of elderly in South Korea and this negatively impacted on life satisfaction. Chronic diseases though common in the elderly tends to impact negatively on life satisfaction and hence quality life of the elderly. This was corroborated in this study where those with presence of at least one chronic disease had worse quality of life scores (70%) than those with no chronic disease (79%). Similarly, Fatma et al (2012) also reported that 11.5% of the elderly in Sivas city of Turkey expressed non-satisfaction with life because of physical health problems. This condition can be ameliorated through deliberate efforts at meeting the peculiar health problems of the elderly. Subsidized medical expenses or a free medical service via social insurance for the elderly is one way to meet this need. In the developed nations, a lot of these services targeting the elderly to improve their lives are in place. The reverse is not the case in most countries in the developing world where peculiar needs of the elderly is not yet on the health agenda and does not appear to be a thing of concern.

Apart from physical health, the other factors that determine life satisfaction in the elderly as conceptualized for the first time by Neugarten (1961) include gender, age, education, income, marital status, social relationships network, social activity level and nursing home life. In this study, most (76.4%) of the respondents were lonely, 70.0% had difficulty relating with others, 8.0% were depressed and 40.4% had severe financial constraints. These findings present a lower quality of life compared to the observations made by Fatma et al (2012) that 11.3% of the elderly interviewed said their income was ‘insufficient’ for them. The differences in the two findings may not be unconnected with the different socio-economic climate prevailing in the two countries. Turkey is higher in the socio-economic ladder than Nigeria. What probably makes the elderly in most African countries to cope in the face of low economic resources at old age is the culture of help available from extended members of the family compared to their counterparts in the developed world. Majority (78.8%) of respondents in this study were being helped in domestic chores by caregivers (children, relatives, house help and grandchildren). This traditional form of care within the family in African countries has in no small way contributed in preventing a more deplorable quality of life in the elderly than is presently seen. This seems to have reflected in the quality of life scores obtained in this study. The mean quality of life scores was 77.5% in all domains. The older elderly, had poorer quality of life scores (75%) compared to the younger elderly (79%). The married and singles had better quality of life scores than divorces and windows/widowers. Respondents with higher education had better scores (80%) than those with lower education (74%). Those with presences of at least one chronic ailment had worse quality of life scores (70%) than those with no chronic disease (79%). Similarly, Fatma et al (2012) also reported that 11.5% of the elderly in Sivas city of Turkey expressed non-satisfaction with life because of physical health problems. This condition can be ameliorated through deliberate efforts at meeting the peculiar health problems of the elderly. Subsidized medical expenses or a free medical service via social insurance for the elderly is one way to meet this need. In the developed nations, a lot of these services targeting the elderly to improve their lives are in place. The reverse is not the case in most countries in the developing world where peculiar needs of the elderly is not yet on the health agenda and does not appear to be a thing of concern.
rural Tanzania is reduced significantly during the ageing process\textsuperscript{22}. Thus, satisfaction with life is a major concern for the elderly population in Africa. Finally, in this study, there was an association between quality of life and age, marital status, education, income, presence of chronic diseases (p < 0.05). With multiple linear regressions, presence of chronic diseases and regular income were the conclusive predictors of quality of life.

**Conclusion**

The health-related quality of life of the elderly in Nigeria as observed in this study is suboptimal. This is mostly due to the presence of chronic diseases and poor economy. Poor quality of life and well-being, and health status in older people are significantly related to level of education, marital status, and age. Specifically, quality of life decreases with poor physical health and low income. Thus, the quality of life is still a major concern for the elderly population and a clear public health challenge requiring immediate intervention.

**Recommendation**

Though the elderly as a group is presently the smallest segment of Nigerian Population, in both absolute number and as a proportion of the total population, the population of the elderly is expected to grow in future and so will be the demand for special services tailored to their needs. It is therefore first of all recommended that a national policy on ageing be put in place that will comprehensively address their peculiar needs including provision of social welfare services like subsidized medical expenses and subsistence allowance.

**References**


12. Bowling, A. Older People’s Quality of Life Questionnaire. St George’s, University of London & Kingston University.

Health workers’ perception and practice of female genital mutilation in a rural community in Edo State, Nigeria.

Oriaifo N, Eifediyyi RA, Eigbefoh J, Aigbonoga M,

Department of Obstetrics and Gynaecology, Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria.

Abstract

Introduction: Female genital mutilation (FGM) and cutting is a subject of global interest, with many countries of the world still practicing it despite efforts by the WHO and other agencies to discourage the practice. In Edo State, the practice of FGM is illegal.

Objective: To determine the perception and practice of FGM among health care professionals (HCPs) in public health institutions in Esan Central Local Government Area, where FGM is illegal.

Methods: A sample of 90 HCPs in Esan Central Local Government Area, completed the pretested semi structured questionnaire. Data analysis was carried out using descriptive statistics and a chi – square test was used to test for association between variables.

Results: The average age of respondents was 30.2 years. Most respondents are of Esan (96.7%). Most respondents (86.7%) identified at all forms of FGM/C, and no respondent was unable to identify at least one form. The harmful effects of FGM/C identified by most respondents include infections, hemorrhage and difficult labor/childbirth. Eighteen (20%) of respondents believed FGM/C has no adverse health effects. Respondents reported culture as the major reason for the performance of FGM/C and 20% of respondents would encourage the continuation of the practice. Eleven respondents (12.2%) admitted having carried out the procedure in the past and twenty-eight respondents (31.1%) supported its medicalisation as a way of making it safer, while sixteen (17.8%) respondents would have their daughters circumcised.

Conclusion: The respondents in this study displayed good knowledge of the problem of FGM/C and the associated adverse health effects. However, some still support its continuation and even medicalisation. Health education campaigns in the area have been proven to be every effective but; a lot still needs to be done to ensure that this dark practice is completely eradicated.

Keywords: Female genital mutilation/cutting (FGM/C), harmful traditional practice, Nigeria.

Introduction

Female genital mutilation, defines all procedures that involve partial or total removal of the external female genitalia, or injury to the female genital organs, for cultural or other non-therapeutic reasons 1. FGM is globally recognised as a violation of the human rights of girls and women, hence its name. An estimated 140 million women and girls in the world have been victims of some form of FGM, and each year, about 3 million more are subjected to, or are at risk of being subjected to, this harmful practice 2.

The exact origin of FGM remains unclear, but it has remained an age long practise in Egypt and a number of sub-Saharan countries, notably Sudan, Nigeria, and Gambia and in parts of the Middle East and Asia 3. Cases of FGM have also been reported in Europe, Australia, and the USA, which are mostly as a result of migration. The reason for this harmful practice has remained shrouded in a complex web of tradition and religion. The various traditional names that represent this practice tend to justify it and trivialise the associated harms. In eastern Nigeria, the Igbo call it ‘Isa aru,’ which means cleansing, signifying that a woman must be cleansed before marriage and child bearing. The Gishiri and Angusya cuts common in northern Nigeria and Niger are believed to preserve the virginity of young girls as well as increase sexual satisfaction, after marriage. In Esan, South South Nigeria, the practice is called ‘Iruan’ which represents
The widespread oppression of women in African societies has been considered as a major reason for the emergence and continuation of the harmful practice of FGM. In Nigeria, FGM was banned by the Federal Government in May 2015 even though the practice had already been outlawed in many states including Edo state since the 1990s. Despite the strict laws against the practice of FGM however, due to very poor law enforcement, and the subordinate position most girls and women find themselves, there is hardly any prosecution of offenders.

Four types of FGM are recognised as classified by WHO, and include; type I (clitoridectomy), type II (excision), type III (infibulation) and type IV which comprises all other harmful procedures performed on the external female genitalia for non-medical purposes (e.g. pricking, piercing, incising, scraping, and cauterisation) 1. FGM is associated with a wide array of deleterious consequences, hence its global notoriety. Acute complications will include haemorrhage, shock, sepsis, severe pain and psychological trauma. And in the long-term, it can result in chronic pain, sepsis, keloids/ hypertrophic scars, fibrosis, primary infertility, difficult deliveries and the attendant complications, and psychological sequela/trauma (eg post traumatic stress disorder) 3,4. Considering the magnitude of possible complications; it is not surprising that despite the huge resources that have been devoted to eradicating this menace, there are still calls for more.

FGM is performed on girls of all ages, ranging from 7 days after birth up to pre-adolescence, before the first menstruation and marriage 5. Occasionally, adult women also subject themselves to this practice, as a consequence of peer pressure and intermarriage 9. Prevalence rates of FGM/C are significantly different between ethnic groups and also between rural and urban communities, in countries where it is practised.

The practice of FGM/C is widespread in Nigeria, and with a population of over 160 million, Nigeria has the highest absolute number of cases of FGM worldwide, accounting for about one-quarter of the estimated 115–130 million circumcised women worldwide 12. The practice tends to be more prevalent in the south-south region (77% among adult women), followed by south-east (68%) and south-west (65%) where mainly types 1 and 2 are performed, the practice is relatively rare in Northern Nigeria, where the more advanced forms dominate 12.

Of significant importance however, is the fact that healthcare providers are involved in this practice, despite the widespread campaign against it by governmental and non-governmental agencies alike 13. FGM/C is traditionally carried out by traditional circumcisers and birth attendants however, with increasing awareness of the adverse health consequences, health care professionals have become increasingly involved in the practice. This trend of ‘medicalizing’ FGM/C has been embraced in some countries eg Egypt 14. This is however not the case in Nigeria where the Government has always supported other non-governmental agencies in discouraging FGM/C. In 1994, a decree was issued by the Federal Government, outlawing FGM/C under the advice of the department of women affairs which was then headed by a female minister. Similarly, in 1999, a bill to abolish FGM was passed into law in Edo State and more recently in May 2015 a similar bill was passed into law by the Federal parliament. Despite this however, FGM/C is still known to be carried out by health care professionals in Nigeria, albeit clandestinely and this has been proven by a study in southwest Nigeria that showed that hospitals were the most popular location for performing FGM/C, and nurses/dispensers were the circumcisers in 39% of cases 15.

There exists a gap in the body of knowledge available to various health professionals on FGM/C as a result of which health education on the subject may require a more streamlined and targeted approach for the various cadres of professionals.

There have been widespread enlightenment campaigns on FGM/C and its attendant adverse health consequences in Nigeria and several studies have been
carried out to assess the knowledge and attitudes of nurses towards FGM/C mainly in urban centres\textsuperscript{16}.

This formed the basis of this study, which aims to explore the knowledge and attitudes of health care professionals in a rural community towards FGM/C and relate these to their practices. The study will also assess the differences in knowledge base as well as attitudes and practices among the different cadres of health care professionals. This will facilitate the development of targeted strategies in the bid to eradicate this public health problem.

**Aims and Objectives**
This study aimed to examine the perception and practice of FGM/C among health care providers (HCPs) in a rural community in Nigeria. To assess differences in perception and practice of FGM/C among the different cadres of HCPs in the study area and to establish the reasons for these differences.

**Method**

**Study Setting**
The study was conducted from June 2015 to September 2015 in Esan Central Local Government Area of Edo State, Nigeria. Esan Central Local Government Area, in Edo Central Senatorial District (ESAN LAND) has its administrative headquarters in IRRUA. The Area has a population of 105,242 mainly Esan people, although quite recently some people from other Ethnicities have migrated to the Area along with new Government Establishments in the Area. The Area is home to 14 public primary health centres, which are uniformly spread across the 14 communities that constitute the area.

**Study Design**

**Population**
The source population comprised of all health care professionals working in public primary health care centres in Esan Central Local Government Area. These included Doctors, midwives, nurses, community health extension workers (CHEWS), health educators, pharmacists, pharmacy technicians, laboratory scientists and health attendants.

**Sampling method**
The total number of public primary health institutions in Esan Central LGA is 14 with a total of 90 health care professionals.

The sample size in this cross-sectional survey was determined using a finite population correction fraction $n = N / (1+N\varepsilon^2)$. The minimum sample size required for the study was estimated to be 73 using the above formula where $n$ is the sample size, $N$ is the population size, $\varepsilon$ is the desired degree of accuracy (taken as 0.05).

Given the minimum sample size above, and the willingness of the care givers to participate in the study, all 90 care givers were recruited.

**Data Collection Instrument**
The questionnaire was designed for the sole purpose of carrying out this study, with contributions from Community Health physicians with interest on the subject matter. Questionnaires were in English, the official language in the country. Four open and 25 close-ended questions were used to collect socio-demographic data (name of institution, occupation, age, sex, ethnic group, and date of interview) and on information regarding the KAP of HCP. The specifics of KAP were as follows. Knowledge on FGM/C and its adverse health consequences and reasons given for performing this practice were examined. Attitudes towards the continuation of FGM/C, possible strategies for preventing it, its medicalisation, the discrimination against girls who do not undergo FGM/C, and the involvement of men in the debate were examined. Practices included assessing if FGM/C is practiced in the HCP’s families/households, whether they would subject their own daughters to the practice, and whether they had ever performed FGM/C.

The questionnaire was validated after being administered to 50 HCPs in Irrua Specialist Teaching Hospital, Irrua.

To achieve the proposed objective, a cross-sectional descriptive study was designed to examine the KAP of Nigerian rural HCPs regarding FGM/C. The survey was conducted in 2015, in Esan Central Local Government Area of Edo state, South- south Nigeria.
The pretested, semi-structured questionnaires were administered, face to face, by the author at the various public health facilities in the Study Area.

**Ethical Aspects**

The study was approved by The Ethics Committee of Irrua Specialist Teaching Hospital. A consent form was included in the questionnaire, and all respondents consented, before recruitment into the study. Rigorous confidentiality over participants’ identity was maintained.

**Data Analyses**

Once collected, the data were computerised via Epidata and analysed in SPSS Version 19. Univariate and bivariate analyses with chi square tests were conducted to detect differences in KAP among HCPS of both sexes, different cadres etc. Intra-sex and inter-sex relationships were tested. Statistical significance was considered at p < 0.05.

**Result**

Table 1 shows the profile of the respondents. The sample composed of 90 HCPs (72.2% women and 27.8% men), with an average age of 30.2 years. It can also be observed that the population was almost homogenous in terms of ethnic origin of the respondents.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Doctors n (%)</th>
<th>Nurses / midwives n (%)</th>
<th>Chew n (%)</th>
<th>Health attendants n (%)</th>
<th>Pharmacists n (%)</th>
<th>Laboratory scientist n (%)</th>
<th>Health educators n (%)</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 – 29</td>
<td>0 (0.0)</td>
<td>12 (31.6)</td>
<td>13 (65.0)</td>
<td>4 (16.7)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (33.3)</td>
<td>30</td>
</tr>
<tr>
<td>30 – 39</td>
<td>1 (50.0)</td>
<td>17 (44.7)</td>
<td>7 (35.0)</td>
<td>14 (58.3)</td>
<td>2 (100)</td>
<td>1 (100)</td>
<td>2 (66.7)</td>
<td>44</td>
</tr>
<tr>
<td>&gt;=40</td>
<td>1 (50.0)</td>
<td>9 (23.7)</td>
<td>0 (0.0)</td>
<td>6 (25.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>16</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2 (100)</td>
<td>4 (10.5)</td>
<td>8 (40)</td>
<td>8 (33.3)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>1 (33.3)</td>
<td>25</td>
</tr>
<tr>
<td>Female</td>
<td>0 (0.0)</td>
<td>34 (89.5)</td>
<td>12 (60)</td>
<td>16 (66.7)</td>
<td>0 (0.0)</td>
<td>1 (100)</td>
<td>2 (66.7)</td>
<td>65</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>0 (0.0)</td>
<td>2 (5.3)</td>
<td>3 (15.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>5</td>
</tr>
<tr>
<td>Married</td>
<td>2 (100)</td>
<td>36 (94.7)</td>
<td>17 (85.0)</td>
<td>24 (100)</td>
<td>2 (100)</td>
<td>1 (100)</td>
<td>3 (100)</td>
<td>85</td>
</tr>
<tr>
<td><strong>Tribe</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esan</td>
<td>2 (100)</td>
<td>34 (89.5)</td>
<td>18 (90)</td>
<td>23 (95.8)</td>
<td>1 (50.0)</td>
<td>1 (100)</td>
<td>2 (66.7)</td>
<td>81</td>
</tr>
<tr>
<td>Bini</td>
<td>0 (0.0)</td>
<td>2 (5.3)</td>
<td>1 (5.0)</td>
<td>1 (4.2)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (33.3)</td>
<td>5</td>
</tr>
<tr>
<td>Etsako</td>
<td>0 (0.0)</td>
<td>1 (2.6)</td>
<td>1 (5.0)</td>
<td>0 (0.0)</td>
<td>1 (50.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>3</td>
</tr>
<tr>
<td>Yoruba</td>
<td>0 (0.0)</td>
<td>1 (2.6)</td>
<td>0 (5.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Duration of practice (years)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;=5</td>
<td>1 (50.0)</td>
<td>4 (10.5)</td>
<td>10 (50.0)</td>
<td>7 (29.6)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>2 (66.7)</td>
<td>24</td>
</tr>
<tr>
<td>6 – 10</td>
<td>0 (0.0)</td>
<td>17 (44.7)</td>
<td>8 (40.0)</td>
<td>5 (20.8)</td>
<td>2 (100)</td>
<td>1 (100)</td>
<td>1 (33.3)</td>
<td>34</td>
</tr>
<tr>
<td>11 – 15</td>
<td>1 (50.0)</td>
<td>10 (26.3)</td>
<td>2 (10.0)</td>
<td>5 (20.8)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>18</td>
</tr>
<tr>
<td>16 – 20</td>
<td>0 (0.0)</td>
<td>4 (10.5)</td>
<td>0 (0.0)</td>
<td>3 (12.5)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>7</td>
</tr>
<tr>
<td>&gt;=21</td>
<td>0 (0.0)</td>
<td>3 (7.9)</td>
<td>0 (0.0)</td>
<td>4 (16.6)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total n(%)</strong></td>
<td>2 (2.2)</td>
<td>38 (42.2)</td>
<td>20 (22.2)</td>
<td>24 (26.7)</td>
<td>2 (2.2)</td>
<td>1 (1.1)</td>
<td>3 (3.3)</td>
<td>90 (100)</td>
</tr>
</tbody>
</table>

Table 1 displays the characteristics of the respondents. The population consists of 2 Medical Doctors, 38 nurses/ midwives, 20 community health extension workers, 24 health attendants, 2 Pharmacists, 1 Laboratory Scientist and 3 Health Educators. The mean age of the respondents is 32.4 years and the mean duration of practice was 9.6 years with 65% of the respondents being female and 25% male. Majority (90%) of the respondents are of Esan origin which is the Ethnicity of the study area. Considering that the above HCPs cover 14 primary health centres it can be inferred that the public health facilities in the study area are inadequately staffed especially in terms of Doctors, Pharmacists, Laboratory Scientists and Health Educators. The following three sections give details of the results in terms of KAP.

**Knowledge**

The assessment of HCPs’ knowledge on FGM/C was performed by exploring the HCPs ability to describe the four types of FGM/C and reasons given for the practice to be performed, as well as through...
acknowledging HCPs’ awareness of its health consequences. The results are shown in Table 2 and 3.

TABLE 2: KNOWLEDGE SCALE 2. Knowledge of FGM/C among health care professionals

<table>
<thead>
<tr>
<th>Reported types of FGM/C known by HCPS</th>
<th>Doctors</th>
<th>Nurses/ Midwives</th>
<th>CHEW n(%)</th>
<th>Health Attendants n(%)</th>
<th>Pharmacists n(%)</th>
<th>Laboratory Scientist n(%)</th>
<th>Health Educators n(%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male n(%)</td>
<td>Female n(%)</td>
<td>Male n(%)</td>
<td>Female n(%)</td>
<td>Male n(%)</td>
<td>Female n(%)</td>
<td>Male n(%)</td>
<td>Female n(%)</td>
<td>Male n(%)</td>
</tr>
<tr>
<td>All four* types</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>2 (50)</td>
<td>34 (100)</td>
<td>6 (75)</td>
<td>11 (91.7)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Three types</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (12.5)</td>
<td>0 (0.0)</td>
<td>2 (25)</td>
<td>1 (6.25)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Two types</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (12.5)</td>
<td>1 (12.5)</td>
<td>0 (0.0)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>One type</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>No type</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Total</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>4 (100)</td>
<td>34 (100)</td>
<td>8 (100)</td>
<td>12 (100)</td>
<td>8 (100)</td>
<td>16 (100)</td>
</tr>
</tbody>
</table>

* For sex Chi-square = 1.37; P-value = 0.05

86.7% of the respondents described all four types of FGM/C and no respondent was unable to describe at least one type. From table 2 the female respondents displayed fairly better knowledge on the subject than the males (90% vs. 76%). This difference was found to not be statistically significant. According to the respondents, FGM/C is mainly performed because it is considered to be deeply rooted in the Nigerian culture (20%) and it is viewed as an effective measure to reduce women’s sexual urges (16.7%). Other reasons given, include the fact that FGM/C is a rite of passage into womanhood (15.6%), a good practice (13.3%), it helps to preserve virginity (12.2%), it reduces the rate of sexual promiscuity among women (10%), and it helps to improve the quality of sexual intercourse (4.4%).

Inter-sex analysis showed that female and male HCPs had quite similar opinions on the main reasons given for performing FGM/C. A similar percentage of male and female respondents (20%) believed the fact that FGM/C is deeply rooted in Nigerian culture was partly responsible for its continued performance. A higher female percentage considered that support towards FGM/C derives partly from the fact that it helps to reduce female sexual urges (16.9% vs. 16%), it helps to reduce female sexual promiscuity (10.8% vs. 8%) and it assists in preservation of virginity till marriage (12.3% vs.12%), whereas a higher percentage of males believed FGM/C was still being practised because it is a rite of passage into womanhood (16% vs. 15.4%), it is a good practice (16% vs. 12.3%) and it improves the quality of sexual intercourse (8% vs. 3.1%). These intersex differences were however found to not be statistically significant.

To evaluate HCPs’ knowledge of FGM/C-related complications, respondents were asked to identify five health consequences through an open-ended question. A considerable percentage of HCPs were able to recognise the negative impact of FGM/C on the health of girls and women. The transmission of infectious diseases was the most reported consequence (80%), which might be explained by the high prevalence of HIV/AIDS in Nigeria and the various campaigns that international organisations working in Nigeria have launched to increase awareness on the routes of transmission as well as the prevention and treatment of HIV/AIDS. Bleeding (80%), difficulties during delivery (66%), and reduction of sexual satisfaction (53%) were also mentioned. However, it should be noted that 18% of the respondents believed that the practice has no adverse consequences. Inter-sex analysis showed that a higher percentage of female respondents referred to future difficult deliveries (75.4% vs. 68%), while a higher percentage of male respondents pointed out the transmission of infectious diseases (84% vs. 78.5%). It was also noted that a similar percentage of female and male respondents believed FGM/C has no adverse health consequences (20% vs. 20%).
## Attitudes

The following questions were used to assess the attitudes of HCPs towards FGM/C: the possibility of its eradication; the roles that can be played by HCPs in the eradication of FGM/C; medicalisation; discrimination towards those who do not undergo FGM/C; and the involvement of men in the debate. The findings are shown in Table 4.

### Table 3: Knowledge scale (Reasons for performance and adverse consequences)

<table>
<thead>
<tr>
<th>Reported answers of HCP about reasons/justifications given by those in support of FGM/C</th>
<th>Number of HCPs (%)</th>
<th>Doctors</th>
<th>Nurses/midwives</th>
<th>CHEWS</th>
<th>Health attendants</th>
<th>Pharmacists</th>
<th>Laboratory scientist</th>
<th>Health educators</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is a deeply rooted cultural practice</td>
<td>18 (20)</td>
<td>2 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (25)</td>
<td>5 (13.2)</td>
<td>1 (12.5)</td>
<td>4 (33.3)</td>
<td>3 (37.5)</td>
</tr>
<tr>
<td>It helps to reduce sexual urges</td>
<td>15 (16.7)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (25)</td>
<td>3 (8.8)</td>
<td>1 (12.5)</td>
<td>4 (33.3)</td>
<td>2 (25)</td>
</tr>
<tr>
<td>It is a rite of passage into womanhood</td>
<td>14 (15.6)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (25)</td>
<td>3 (8.8)</td>
<td>1 (12.5)</td>
<td>3 (25)</td>
<td>2 (25)</td>
</tr>
<tr>
<td>It is a good practice</td>
<td>12 (13.3)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (25)</td>
<td>2 (5.9)</td>
<td>1 (12.5)</td>
<td>3 (25)</td>
<td>2 (25)</td>
</tr>
<tr>
<td>It helps to preserve the virginity of girls for their future husbands</td>
<td>11 (12.2)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>3 (8.8)</td>
<td>1 (12.5)</td>
<td>2 (16.7)</td>
<td>2 (25)</td>
</tr>
<tr>
<td>It helps to reduce the rate of sexual promiscuity</td>
<td>9 (10)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>2 (5.9)</td>
<td>1 (12.5)</td>
<td>2 (16.7)</td>
<td>1 (12.5)</td>
</tr>
<tr>
<td>It improves the quality of sexual intercourse</td>
<td>4 (4.4)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (25)</td>
<td>0 (0.0)</td>
<td>1 (12.5)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>

### Table 4: Transmission of HIV and other infectious diseases

<table>
<thead>
<tr>
<th>Reported answers of HCP about health consequences of FGM/C</th>
<th>Number of HCPs (%)</th>
<th>Doctors</th>
<th>Nurses/midwives</th>
<th>CHEWS</th>
<th>Health attendants</th>
<th>Pharmacists</th>
<th>Laboratory scientist</th>
<th>Health educators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission of HIV and other infectious diseases</td>
<td>72 (80)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>3 (75)</td>
<td>29 (85.3)</td>
<td>7 (87.5)</td>
<td>8 (66.7)</td>
<td>4 (50)</td>
</tr>
<tr>
<td>Bleeding</td>
<td>72 (80)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>3 (75)</td>
<td>29 (85.3)</td>
<td>7 (87.5)</td>
<td>8 (66.7)</td>
<td>4 (50)</td>
</tr>
<tr>
<td>Future difficult deliveries</td>
<td>66 (73.3)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>3 (75)</td>
<td>29 (85.3)</td>
<td>7 (87.5)</td>
<td>8 (66.7)</td>
<td>2 (25)</td>
</tr>
<tr>
<td>Reduction in sexual satisfaction</td>
<td>53 (58.9)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>3 (75)</td>
<td>25 (73.5)</td>
<td>5 (62.5)</td>
<td>7 (58.3)</td>
<td>2 (25)</td>
</tr>
<tr>
<td>Psychological trauma</td>
<td>47 (52.2)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>1 (25)</td>
<td>24 (70.6)</td>
<td>4 (50)</td>
<td>5 (41.7)</td>
<td>2 (25)</td>
</tr>
<tr>
<td>Difficult penetration and coital lacerations</td>
<td>34 (37.8)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>3 (75)</td>
<td>16 (47.1)</td>
<td>3 (37.5)</td>
<td>3 (25)</td>
<td>1 (12.5)</td>
</tr>
<tr>
<td>No adverse consequence</td>
<td>18 (20)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (25)</td>
<td>5 (14.7)</td>
<td>1 (12.5)</td>
<td>4 (33.3)</td>
<td>3 (37.5)</td>
</tr>
<tr>
<td>Has seen/managed a girl with complications of FGM/C</td>
<td>37 (40.9)</td>
<td>2 (100)</td>
<td>0 (0.0)</td>
<td>3 (75)</td>
<td>17 (50)</td>
<td>2 (25)</td>
<td>4 (33.3)</td>
<td>3 (37.5)</td>
</tr>
</tbody>
</table>
A small percentage of the respondents (20%) believed that FGM/C should continue to be practiced and a similar percentage of female and male respondents were of this opinion (20% vs. 20%). Inter-sex analysis also showed that a higher percentage of male respondents believed that it was possible to eradicate the practice (92% vs. 83.1%). Similarly, a higher percentage of male HCPs had the opinion that HCPs have a role to play in the eradication of the practice (80% vs. 75.4%).

The above table also shows that 31.1% of all HCPs considered medicalisation as being a safer option when compared to the traditionally performed procedure and this was more popular among female respondents than males (36.9% vs. 16%). 47.8% of the respondents however viewed medicalisation as a way of encouraging FGM/C and 74.4% recommended that it should be stopped at all levels. A higher percentage of male respondents were against medicalisation of FGM/C (84% vs. 70.8%, \( p = 0.05 \)).

---

### Table 4. Attitudes of health care professionals towards FGM/C

<table>
<thead>
<tr>
<th></th>
<th>Number of HCPs (%)</th>
<th>Doctors</th>
<th>Nurses/midwives</th>
<th>CHEWs</th>
<th>Health attendants</th>
<th>Pharmacists</th>
<th>Laboratory scientist</th>
<th>Health educators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male n(%)</td>
<td>Female n(%)</td>
<td>Male n(%)</td>
<td>Female n(%)</td>
<td>Male n(%)</td>
<td>Female n(%)</td>
<td>Male n(%)</td>
<td>Female n(%)</td>
</tr>
<tr>
<td>Do you think that the practice of FGM/C should continue? *</td>
<td>Yes</td>
<td>18(20.4)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>1(25.0)</td>
<td>5(14.7)</td>
<td>4(33.3)</td>
<td>2(37.5)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>72(80.6)</td>
<td>2(100)</td>
<td>0(0.0)</td>
<td>7(75.0)</td>
<td>29(85.7)</td>
<td>7(87.5)</td>
<td>3(66.7)</td>
</tr>
<tr>
<td>Do you think that girls that have not had FGM/C should be discriminated against?</td>
<td>Yes</td>
<td>13(4.4)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>2(5.9)</td>
<td>0(0.0)</td>
<td>3(25.0)</td>
<td>2(25.0)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>77(85.6)</td>
<td>2(100)</td>
<td>0(0.0)</td>
<td>4(100)</td>
<td>32(94.1)</td>
<td>8(100)</td>
<td>9(75.0)</td>
</tr>
<tr>
<td>Do you think the practice of FGM/C can ever be eradicated in Nigeria?</td>
<td>Yes</td>
<td>77(85.6)</td>
<td>2(100)</td>
<td>0(0.0)</td>
<td>4(100)</td>
<td>32(94.1)</td>
<td>8(100)</td>
<td>9(75.0)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>13(14.4)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>2(5.9)</td>
<td>0(0.0)</td>
<td>3(25.0)</td>
<td>2(25.0)</td>
</tr>
<tr>
<td>Do you think men should be involved in the debate on FGM/C?</td>
<td>Yes</td>
<td>63(70)</td>
<td>2(100)</td>
<td>0(0.0)</td>
<td>3(75.0)</td>
<td>29(85.7)</td>
<td>7(87.5)</td>
<td>7(58.3)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>27(30)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>1(25.0)</td>
<td>5(14.7)</td>
<td>1(12.5)</td>
<td>5(41.7)</td>
</tr>
<tr>
<td>Do you think HCPs have a role to play in eradicating FGM/C?</td>
<td>Yes</td>
<td>69(76.7)</td>
<td>2(100)</td>
<td>0(0.0)</td>
<td>4(50.0)</td>
<td>30(88.2)</td>
<td>7(87.5)</td>
<td>6(50.0)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>21(23.3)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>4(11.8)</td>
<td>1(12.5)</td>
<td>6(50.0)</td>
</tr>
<tr>
<td>What do you think of ‘MEDICALIZING’ FGM/C?</td>
<td>-it will make the practice safer</td>
<td>28(31.1)</td>
<td>0(0.0)</td>
<td>0(0.0)</td>
<td>1(25.0)</td>
<td>6(50)</td>
<td>1(12.5)</td>
<td>5(41.7)</td>
</tr>
<tr>
<td></td>
<td>-it will encourage FGM/C</td>
<td>43(47.8)</td>
<td>2(100)</td>
<td>0(0.0)</td>
<td>3(75.0)</td>
<td>19(55.9)</td>
<td>5(62.5)</td>
<td>3(25.0)</td>
</tr>
<tr>
<td></td>
<td>-it should be discouraged at all levels</td>
<td>67(74.4)</td>
<td>2(100)</td>
<td>0(0.0)</td>
<td>3(75.0)</td>
<td>24(70.6)</td>
<td>7(87.5)</td>
<td>5(78.3)</td>
</tr>
</tbody>
</table>

*For sex analysis Chi-square = 3.49; P-value = 0.05
14.4% of the respondents were found to have discriminatory attitudes against those who do not undergo FGM/C. Analysis for sex difference showed that more female respondents had this discriminatory attitude (16.9% vs. 8%). A significant percentage of HCPs (70%) considered that men should be involved in the debate on FGM/C and this opinion was welcomed more by the male respondents (72% vs. 69.2%).

**Practices**

The practices of FGM/C among the respondents were assessed by three close ended questions and the results obtained are as shown on table 5.

---

**Table 5. Practices of FGM/C among health care professionals**

<table>
<thead>
<tr>
<th></th>
<th>Number of HCPs (%)</th>
<th>Doctors</th>
<th>Nurses/ Midwives</th>
<th>CHEW</th>
<th>Health attendants</th>
<th>Pharmacists</th>
<th>Laboratory Scientists</th>
<th>Health Educators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is FGM/C practiced in your family/household?</td>
<td>Yes 19 (21.1)</td>
<td>0 0 2 5 1 5 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No 71 (78.9)</td>
<td>2 0 2 29 7 7 8 10 2 0 0 1 1 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will you subject your daughter to circumcision?</td>
<td>Yes 16 (17.8)</td>
<td>0 0 2 3 1 4 1 5 0 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No 74 (82.2)</td>
<td>2 0 2 31 7 8 7 11 2 0 0 1 1 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a health care* provider, have you ever carried out FGM/C on a girl?</td>
<td>Yes 11 (12.2)</td>
<td>0 0 2 5 0 4 0 0 0 0 0 0 0 0 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No 79 (87.8)</td>
<td>2 0 2 29 8 8 8 16 2 0 0 1 1 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*for profession, chi square=0.000; p-value=0.05

---

FGM/C was reportedly practised in the families of 21.1% of the respondents and 17.8% admitted to having the intention of subjecting their daughters to circumcision. When these practices were subjected to intersex analysis, it was discovered that a higher percentage of females had FGM/C practised in their families (12.6% vs. 12%), and same was the case for willingness to subject their female children to circumcision (18.5% vs. 16%). It is however worthy of note that all the health care professionals that had FGM/C practised in their families or intended to circumcise their daughters were either nurses/ midwives, CHEWs or health attendants.

Although 74.4% of the respondents were of the opinion that medicalisation of FGM/C be discouraged at all levels, 12.2% admitted to have carried out the practice in the course of their careers and more female HCPs were involved (13.8% vs. 8%). Once again it is noted that all HCPs that admitted to have carried out the procedure in the past were either nurse/ midwives, CHEWs or health attendants and this professional difference was found to be statistically significant (p=0.000).

An association was also sought between the attitudes of the HCPs towards a continuation of the practice of FGM/C and various characteristics of the respondents via bivariate and multivariate analysis, using chi square test to seek for statistical significance. The findings are as represented on table 6.

The above findings show that although there are differences among the HCPs in terms of sex, age, duration of practice and profession, the only variables with statistically significant difference were age and profession. It can thus be inferred that willingness to continue the practice of FGM/C among HCPs is related to nurses/ midwives, CHEWs and health attendants in the 30–39 age group.
Further analysis was however carried out among the nurses/midwives, CHEWs and Health attendants to determine factors that are related to their support or otherwise towards the eradication of FGM/C and the results are presented below;

The below table shows that a higher percentage of CHEWs and health attendants that have been in health service delivery for between 11 and 15 years (50 and 40% respectively) and nurses that have been in public health delivery service for between 16 and 20 years (50%) show support for the continuation of FGM/C and this was the only statistically significant factors associated with support for the continuation of FGM/C among these cadres of HCPs in the study population.

TABLE 7: Factors Affecting Support For FGM/C Among Nurses/midwives, CHEWs and Health Attendants in Esan Central LGA.

<table>
<thead>
<tr>
<th>Variable</th>
<th>FGM/C should be eradicated n(%)</th>
<th>FGM/C should continue n(%)</th>
<th>P – value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male 20(80)</td>
<td>5(20)</td>
<td>0.606</td>
</tr>
<tr>
<td></td>
<td>Female 52(80)</td>
<td>13(20)</td>
<td></td>
</tr>
<tr>
<td>Age in years</td>
<td>20 – 29 27(90)</td>
<td>3(10)</td>
<td>0.011</td>
</tr>
<tr>
<td></td>
<td>30 – 39 33(75)</td>
<td>11(25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>=&gt;40 12(75)</td>
<td>4(25)</td>
<td></td>
</tr>
<tr>
<td>Profession</td>
<td>Doctor 2(100)</td>
<td>0(0.0)</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Nurse/Midwife 32(84.2)</td>
<td>6(15.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHEW 15(75)</td>
<td>5(25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health Attendants 17(70.8)</td>
<td>7(29.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pharmacists 2(100)</td>
<td>0(0.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Laboratory Scientist 1(100)</td>
<td>0(0.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health Educators 3(100)</td>
<td>0(0.0)</td>
<td></td>
</tr>
<tr>
<td>Duration of Practice</td>
<td>&lt;=5 23(95.8)</td>
<td>1(4.2)</td>
<td>0.425</td>
</tr>
<tr>
<td></td>
<td>6 – 10 27(79.4)</td>
<td>7(20.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 – 15 12(66.7)</td>
<td>6(33.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16 – 20 5(71.4)</td>
<td>2(28.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;=21 5(28.6)</td>
<td>2(28.6)</td>
<td></td>
</tr>
</tbody>
</table>

\Discussion

FGM/C has continued to attract far reaching global interest, with significant governmental and nongovernmental commitments to eradicate it and it attendant adverse consequences. It is however still practiced in many countries with Nigeria having the highest prevalence despite the magnitude of resources that have been invested into its eradication.

Esan Central Local Government Area, is a rural area in Edo State Nigeria, where the practice of FGM/C is known to exist. It is known as ‘IRUEN’ by the locals, which is interpreted as an act of transition to womanhood.

The findings of this study indicate a high level of awareness of FGM/C among the HCPs in this rural area and majority (80%) of them are against the
continuation of the practice. This may not be unrelated to widespread health education campaigns carried out by various governmental and non-governmental bodies in the area, most notable of which are; Society of Obstetricians and Gynaecologists of Nigeria (SOGON), Edo State Chapter, and more recently the Medical Women Association (MWAN).

There was also widespread good knowledge on the classification of FGM/C across all cadres of the HCPs in this study. This was unlike a study in Benin, south-south Nigeria on Nurses where only 6.6% of respondents could describe all four types of FGM/C.16 This may reflect improvements in school curriculums in the intervening period between these studies.

Majority of the respondents rightly identified transmission of infections and hemorrhage as being major complications of FGM/C and this was similar to the study in Benin where 97.8% of the respondents identified hemorrhage as a complication of FGM/C. Other complications outlined by the respondents were not unlike those that have been previously documented by other authors.18,19,20

It has been demonstrated in existing studies that FGM/C may have a causal relationship with prolonged/obstructed labour17 and 73.3% of the respondents in this study believed future difficult deliveries were a complication of FGM/C.

Despite the generally good knowledge of FGM/C displayed by the respondents, it was shocking that 20% of the respondents believed FGM/C has no adverse health consequences and 13.3% believe it is a good practice. This contrasts with the conclusion by the WHO that FGM/C has no known health benefits only adverse effects.14 These findings were notably limited to a subset of HCPs that included nurses/midwives, CHEWs and health attendants and this brings to fore the knowledge gap that exists between various cadres of HCPs.

This study also demonstrated that while majority of the respondents were in support of abandoning the practice of FGM/C (80%), a significant minority (20%) embraced its continuation. And it should be noted that the respondents in support of the continuation of this practice were again restricted to a subset of the respondents (nurses/midwives, CHEWs and health attendants), a finding that was found to be statistically significant. Similarly, only a minority (17.8%) intended to carry out FGM/C on their daughters, while 12.2% of respondents have in the past carried out FGM/C. And yet again these findings were limited to the same subset of HCPs that support the continuation of FGM/C. It was however discovered on further analysis that support for the continuation of FGM/C among these subset of HCPs is related to their duration of practice in the public health care delivery system.

The above is evidence that FGM/C is already being medicalized. These are surprising findings considering the available knowledge on FGM/C and this may point to the fact education alone may not be sufficient to eradicate bad health practices. However, the findings have been able to streamline the subset of HCPs who support the continuation of FGM/C and who are also responsible for its medicalisation thus, providing a target for future interventions in terms of health education and enlightenment campaigns.

A lot of intersex differences were present in the responses by the HCPs however; these differences were not statistically significant. FGM/C had similar support from women and men as demonstrated by the percentage of respondents that believed the practice FGM/C be allowed to continue. However, male HCPs showed more confidence in the possibility of its eradication (92% vs. 83.1%), higher endorsement of the role of HCPs in the eradication (80% vs. 75.4%), and lower intention to have it performed on their own daughters (16% vs. 18.5%) than female HCPs. It was also discovered that females displayed a more discriminatory attitude towards other females that had not undergone FGM/C than males (16% vs. 8%) and were similarly aware of the deep cultural roots of FGM as the males. These findings demonstrated the unwillingness of the rural woman to be liberated from male domination in society, and how tenaciously some people will hold on to so-called societal norms.

These findings can be explained by the fact that women have contributed to the inculcation of FGM/C into womanhood and culture. In male dominated societies, women tend to add value and importance to practices that characterise their subordination as a coping mechanism and eventually these practices become their
identity. FGM/C is one of such practices, and over the years has given those who practise it a sense of belonging. This value is lacking in those who do not undergo FGM/C, hence their discrimination.

The finding that 72% of male HCPs considered that men should participate in the debate surrounding FGM/C and 84% want it discouraged at all levels, suggests their willingness to be involved in eradicating the practice and its attendant harmful consequences. However, this may not reflect general male attitude toward FGM as the respondents are HCPs who have objective knowledge of the adverse health consequences of FGM/C. It should also be noted that even among these HCPs who have some medical training, 20% still consider FGM/C to have no adverse consequences. Further investigation will however be needed in the area of male attitudes, toward this ‘female’ practice.

This study showed that medicalisation is already a reality in Nigeria, as it is in some other African countries, with 12.2% of HCPs mainly nurses/midwives, CHEWs and health attendants confirming to have performed FGM/C on girls. Although a higher percentage of female HCPs (13.8%) admitted to indulging in the practice, 8% of male respondents also did, which shows that in the medical setting there are no sexual barriers in the practise of FGM/C. It was also noted that 31.1% HCPs supported the idea of medicalizing FGM/C to make it a safer practice as opposed to what is presently obtainable. Although it has been demonstrated that medicalisation reduces the occurrence of adverse consequences, FGM/C is not associated with any known health benefits and is globally discouraged.

It should however be noted that, medicalisation has been publicly condemned by WHO as it creates a sense of legitimacy, gives the erroneous impression that the practice is harmless, and represents a break in medical professionalism and ethical responsibility [3]. FGM in all forms has been formally outlawed in Nigeria, following the May 2015 nationwide ban of the procedure by the Federal Government.

Conclusions

The findings of this study suggest that HCPs in Esan Central Local Government Area have a good knowledge of FGM/C, the reasons for its practise and the attendant complications. This is a good testament to the efforts that have been put into enlightenment campaigns and health education on the subject matter in rural areas in Nigeria. However, although low, the percentage of respondents that support the practice of FGM/C is still concerning. And although this support was equally distributed among the sexes, there were statistically significant differences in terms of profession (nurses/midwives, CHEWs and health attendants) and age (30 - 39). This indicates the need for even more effort to be put in to driving home the magnitude of the consequences that can result from this barbaric practice, with particular attention to be paid to the subset of HCPs who support its continuation and contribute to its medicalization.

It is pertinent to note that a higher percentage of females supported discrimination against women who are not circumcised, and supported medicalizing the practice to make it safer and similarly, less females believe that the practice can be eradicated and that HCPs have a role to play in its eradication. These findings are pointers to the fact that females are major contributors to the propagation of discrimination against women and practices that characterize it.

Majority of the HCPs in Esan Central Local Government Area do not support the practice of FGM/C. However, 21.2% of the respondents reported that the practice is still being carried out in their families, 17.8% plan to circumcise their daughters and 12.2% have actually carried out the practice in the past and these were mainly nurses/midwives, CHEWs and health attendants. These findings show that though on a small scale, this dark practice of FGM/C is still being carried among the inhabitants of the study area and unfortunately is being supported and medicalized by a subset of HCPs.

Recommendations

Similar studies should be conducted on a larger scale in order to circumvent the limitations from this study and get a more universal picture of the KAP of FGM/C among HCPs.

FGM/C is a crime under Nigerian law but enforcement of the law remains a problem and efforts to draw the attention of law enforcement agencies to this lingering
health problem and other similar issues must be heightened and HCPs have to be awake to their responsibility of curbing these menaces.

References

Histopathological review of peripheral lymphoid organs in children in a sub-urban setting

Igbe AP, Owobu CI

Histopathology Department, Irrua Specialist Teaching Hospital, Irrua

Abstract

The study was a 3-year retrospective histopathological review of samples of peripheral lymphoid organs of children aged 0-16 years received in the Histopathology Department, Irrua Specialist Teaching Hospital (ISTH), Irrua, between October 2010 and September 2013. A total of 183 specimens of children aged 0-16 years were received out of which 53 (29%) were lymphoid specimens: 26 males and 27 females. Adeno-tonsilar tissue was the most common lymphoid tissue accounting for 75.5% followed by cervical lymph node (15.1%). Reactive hyperplasia which accounted for 81.1% was the most common diagnosis, followed by non-Hodgkins lymphoma (7.5%), Hodgkins lymphoma (5.7%) and tuberculosis (5.7%).

Keywords: Peripheral lymphoid organs, children, reactive hyperplasia

Introduction

The peripheral lymphoid organs comprising lymph nodes, spleen and mucosa-associated lymphoid tissues, are the sites of accumulation and further maturation of lymphocytes after their initial development in bone marrow and thymus.¹ These organs undergo changes as a result of diseases primarily affecting them and in several cases as a result of diseases affecting other organs, or diseases that are systemic in nature. These lymphoid tissues have been observed to be most immunologically active in children between 4 and 10 years of age with the immunological activity decreasing after puberty.²

Children are not little adults and the diseases they suffer from are not mere variants of adult diseases. Instead, the diseases encountered in this age group are unique or take distinctive forms.³ Analyzing lymphoid organs in this age group, therefore, can be a useful tool in the study and diagnosis of diseases in children. However, but in this study, adenotonsilar tissue constituted 75.5% of the specimens.⁴

This study aims at reviewing the diagnostic entities with biopsy of lymphoid organs made in the Histopathology Department, ISTH, since commencement of histopathology services in October 2010

Material and Methods

This was a 3-year retrospective analysis of biopsies of lymphoid organs in children aged 0–16 years as seen in the Histopathology Department, Irrua Specialist Teaching Hospital, Irrua, Edo state, between October 2010 and September 2013. Information about the specimens were extracted from the specimen register and request forms in the Department. All the specimens were formalin-fixed and paraffin-embedded. They were sectioned at 3-5 microns and stained with hematoxylin and eosin. The data generated was tabulated and analyzed with respect to age, sex and site. Ethical clearance for the study was obtained from the Hospital’s ethical committee. The study was, however, limited by unavailability of immunohistochemistry for further characterization of lesions.

Result

During the period under review, a total of 183 biopsies from children aged 0-16 years were received in the
histopathology laboratory, ISTH. Out of these, 53 were lymph node and adeno-tonsilar specimens, representing 29% of all specimens in this age group. The sex distribution of the biopsies was almost equal with 26 cases occurring in males and 27 in females.

Table 1 shows the age, sex, and site distribution of the specimens while table 2 shows the age and sex distribution of the histological diagnosis from these specimens. The number of specimens decreased with increasing age as there were 24, 21, and 8 cases in the 0–4yrs, 5–9yrs and 10–14yrs age group respectively.

Table 3 shows the site distribution of the various lesions diagnosed.

In all, adeno-tonsilar tissue was the most common lymphoid organ sent for histological examination while reactive hyperplasia was the most commonly diagnosed lesion. It is noteworthy that the exact site of specimens was not stated in as much as 7.1% of the specimens analyzed.

---

Table 1- Age, Sex and Site Distribution

<table>
<thead>
<tr>
<th>Site</th>
<th>Age Group (years)</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 – 4</td>
<td>5 – 9</td>
</tr>
<tr>
<td>Tonsils/adenoids</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Cervical LN</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Axillary LN</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Mesenteric LN</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unstated</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

M – Male; F – Female; T – Total

Table 2 – Age, Sex and Diagnosis Distribution

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Age Group (years)</th>
<th>Grand total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 – 4</td>
<td>5 – 9</td>
</tr>
<tr>
<td>RH</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>NHL</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HL</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TB</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

M – Male; F – Female; T – Total

Table 3 – Diagnosis and Site Distribution

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Site</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tonsils/adenoids</td>
<td></td>
</tr>
<tr>
<td>RH</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>NHL</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>HL</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>TB</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>8</td>
</tr>
</tbody>
</table>

RH- REACTIVE HYPERPLASIA; NHL- NON-HODGKIN LYMPHOMA; HL- HODGKIN LYMPHOMA; TB- TUBERCULOSIS; LN- LYMPH NODE

Discussion

A total of 53 paediatric lymphoid samples were received over the 3 years under review amounting to 18.6 samples/year. This is relatively low compared to the 49.2/year and 41.7/year recorded in Port Harcourt and Ilorin respectively, but comparable to 12.6/year recorded in Benin and 12.1/year recorded in Ife.

Adenoids and tonsils were the predominant lymphoid organ in this study accounting for 75% of the samples analyzed. These lymphoid tissues have been
observed to be immunologically active between 4 and 10 years of age with the immunological activity decreasing after puberty. Most (95%) of the cases encountered in this series were found in children aged less than 10 years.

Cervical lymph node which followed adenoid/tonsils in frequency in this series is the most commonly encountered lymphoid organ in many other studies. Axillary lymph nodes and mesenteric lymph nodes were the other lymph node groups we encountered and they are also among the commonly encountered site for lymph node enlargement in many series.

Non-neoplastic lesions (reactive hyperplasia and tuberculosis) made up the majority (86.8%) of lesions in this study. This may be unconnected to the burden of infection in our environment. Similar findings were obtained by Obiorah and Offor in Port Harcourt where 70% of lymph node lesions in children and adolescent were non-neoplastic.

Reactive hyperplasia is the benign and reversible enlargement of lymphoid tissues in response to antigen stimulation. Over 80% of the diagnosis made during the period under review belonged to this category. This is in consonance with the observation made by Obiorah and Ray-Offor that RH was most commonly encountered in children and adolescent attributing it to the less developed immune system in children making them more prone to infectious and non-infectious causes of reactive hyperplasia. Non-specific reactive changes also accounted for 47.8% of the cases of cervical lymph node analyzed by SW More. In the study by Adelusola et al in Ife Nigeria, non-specific changes were also very high accounting for 31% of cases. In this series, inclusion of adenotonsilar tissues which were excluded in most other studies may have contributed to the high incidence of reactive hyperplasia.

The other pathologic entities encountered in this series were lymphomas (4 non-Hodgkins lymphoma and 3 Hodgkins lymphoma) and tuberculosis. These entities are not uncommon in the paediatric age group. They made up 17.4%, 5.6% and 48.4% respectively of the lesions encountered by Olu-Eddo and Egbagbe in their review of 126 lymph node biopsies seen over a 20-year period.

It is pertinent to note that the majority (87.5%) of lesions encountered in the cervical lymph node were neoplastic and infectious diseases requiring drug therapy. This is similar to findings by other researchers.

Generally, there was a slight female preponderance of lesions with a M: F ratio of 1: 1.04. However, malignant tumours were preponderant in males as 5 of the 7 malignant lesions (71.4%) encountered in this study occurred in males. In a previous study of neoplasms of childhood, Igbe et al observed that malignant lesions occurred more frequently in males while benign tumours occurred more frequently in females.

Conclusion

Some important observations were made in this study. One, most adenotonsilar lesions in children are benign non-specific reactions to antigenic stimulation or reactions to diseases elsewhere in the body. Two, most cervical lymph node lesions are neoplastic or infectious conditions which require drug intervention to halt disease progression. Three, inadequacy of clinical information supplied by clinicians is also prominent in this study as the site of specimen in 7.1% of cases was not stated. Although most of the lesions encountered were benign, the importance of lymph node biopsy is underscored by the diagnosis of a single case of malignant or infectious conditions which may be fatal if not halted by therapeutic intervention.

References


Morphological pattern of paediatric tumours in Warri, Southern Nigeria

IgbeAP1, Nwanchokor FN2, Forae GD3

1Department of Pathology, Ambrose Alli University, Ekpoma
2Department of Pathology, Igbinedion University, Okada
3Department of Pathology, School of Medicine, University of Benin

Abstract

Background: Tumours are emerging as an important cause of mortality in the paediatric age group. However, childhood tumour patterns in Warri, Nigeria are not known. This study aims at documenting the morphological patterns of these tumours as seen at Central Hospital Warri.

Materials and Methods: The study was 7-year retrospective analysis of all histologically diagnosed tumours in children age 0 – 16 years seen at the Department of pathology, Central Hospital Warri, Nigeria.

Results: Seventy-five tumours comprising of 60 benign and 15 malignant tumours were diagnosed histologically during the study period. The ratio of benign to malignant tumours was 4:1. The Male to Female ratio for benign tumours was 1:4.5 while the male to female ratio for malignant tumours was 4:1. The mean age for benign and malignant tumour was 13 years (3.6SD) and 11 years (4.8SD) respectively. Breast tumours accounted for (48.3%) of all benign childhood tumours. Lymphomas and osteosarcoma constitute 26.6% and 20% of all malignant childhood tumours respectively.

Conclusion: Benign tumours are more common in the paediatric age group. The most common benign tumours are breast tumours with fibroadenoma constituting the vast majority while lymphoma is the most common paediatric malignant tumour.

Key-words: Paediatric Tumours, Lymphoma, Fibro-adenoma

Introduction

Tumours are relatively rare in the children and those encountered in the paediatric age group particularly the cancers are unique in many respect.1 Tumours account for a significant percentage of morbidity and mortality in children. Quinn et al observed that cancer develops in approximately 1 in 600 children aged between 1 and 15 years making it the second most common cause of death in this age group.2 Among Caucasians, cancer is the leading cause of childhood mortality.3 4 Kang et al in Ibadan, Nigeria, in 1992 reported that malignancies are the fourth leading cause of childhood mortality.5 It will be appreciated from these studies that neoplasms are among the leading causes of childhood mortality.

The authors are not aware that any work has been done previously in Warri, Southern Nigeria on the patterns of these neoplasms. A study of these tumours which imparts greatly on childhood and the general population at large is therefore of great interest. The present study is being carried out to determine the relative frequency and the histopathological patterns of childhood tumours as seen at Central Hospital Warri, Nigeria. The study also aims at determining the age and sex distribution patterns of these tumours. It is hoped that findings from this study will contribute to the pool of knowledge and enhance the practice of paediatric pathology in the West African sub-region. It will also help clinicians to be aware of the common tumour to expect in this age group in this environment where only few hospitals patronize histopathological facilities.
Materials and Methods

The study was a 7-year retrospective analysis of all histologically diagnosed neoplastic lesions in children aged 0 – 16 years in the Histopathology Department of Central Hospital Warri, Southern Nigeria from January 2005 to December 2011. The hospital is the only Centre in Warri metropolis and its environs offering histopathology services. Therefore, it is a major referral Centre for histopathology services from government and privately owned hospitals in Delta state, Southern Nigeria. Records of cases were obtained from the histopathology surgical day books of the Department. All specimens were Formalin Fixed Paraffin Embedded (FFPE) and were sectioned and stained with haematoxylin and eosin. Special stains such as phosphotungstic acid haematoxylin (PTAH) and reticulin were employed for further characterization of tumour where necessary. All the slides were reviewed using standard compound light microscope. The age, sex and histopathological variants were presented in frequency distribution tables with mean standard deviation (SD) and analyzed using the Statistical Package for Social Sciences (SPSS) version 17 Statistical Package (SPSS) incorporated. Chicago, Illinois USA.

Results

A total of 947 tumours were diagnosed in the Histopathology Department Central Hospital Warri Delta State during the 7-year period under review. Out of these, 75 cases constituting 7.9%, were neoplasms occurring in the paediatric age group. Sixty of the 75 cases accounting for 80% were benign tumours while 15 cases (20%) were malignant tumours. The ratio of benign tumours to malignant tumours was 4:1. The Male to Female ratio for benign tumours was 1:4.5 while the Male to Female ratio for malignant tumours was 4:1. The mean ages for benign and malignant tumours were 13years ± 3.6 SD and 11 years ± 4.8 SD respectively.

Table 1 shows the age and sex distribution of the malignant tumours. The lymphoma encountered included 1 Burkitt and 3 Hodgkin’s type while the carcinoma was a metastatic squamous cell carcinoma to the cervical lymph node.
and dermatofibroma and 1 case each of giant cell tumour and leiomyoma of the intestine. Encountered epithelial tumours were 2 cases of squamous cell papilloma, 1 case each of basal cell adenoma and oncocytic adenoma while peripheral nerve sheath tumours were 2 cases of schwannoma and 1 case of granular cell tumor. The only bone tumour seen was osteoblastoma. Table 3 shows the regional anatomical distribution of all tumours.

Table 3: Anatomical Distribution of Paediatric Tumours

<table>
<thead>
<tr>
<th>Anatomic region</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest</td>
<td>33(44.4%)</td>
</tr>
<tr>
<td>Abdomen</td>
<td>10(13.3%)</td>
</tr>
<tr>
<td>Upper limb</td>
<td>10(13.3%)</td>
</tr>
<tr>
<td>Head and neck</td>
<td>9(12.0%)</td>
</tr>
<tr>
<td>Lower limb</td>
<td>5(6.7%)</td>
</tr>
<tr>
<td>Unspecified</td>
<td>8(10.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>75(100.0%)</td>
</tr>
</tbody>
</table>

**Discussion**

This study shows that benign childhood tumours outnumbered the malignant tumours in a ratio of 4:1 in favour of the benign tumours. This report is in agreement with previous observations of paucity of malignant tumours as compared to benign tumours among Caucasian children.6-9 On the contrary, a previous study by Igbe et al10 in Benin City, Nigeria found malignancies to be slightly more common than benign tumours in a ratio of 1.1:1.0. This reason for this observation may be attributed to late presentation of children with benign tumours to hospitals as most Nigerians prefer the non-orthodox healing homes for treatment only to present late to hospitals when the condition has deteriorated.

In this study lymphoma was the most common malignancy just like in many other studies in Nigeria and other African countries.11-17 Most of these studies reported Burkitt lymphoma as the most common lymphoma in children. However, a decline in the frequency of Burkitt’s lymphoma has been observed by some previous workers11-13,18 and in the present series, only 1 case was encountered. Indeed, the predominant lymphomas in this study were Hodgkin’s lymphoma which accounted for 75% of the lymphomas.

Osteogenic sarcoma is the most common primary bone malignancy excluding haematopoietic malignancies.19, 21 This tumour occurs at any age with about 75% of cases occurring in people aged less than 20 years.20 It is among the commonly diagnosed childhood malignancies in Ibadan,11 Calabar,16 Ife,15 Lagos 13 and Kor Le Bu17. In this series, it is the most common malignancy after lymphoma accounting for 20% of malignant tumours.

Rhabdomyosarcoma and nephroblastoma each accounted for 13.3% of all malignant tumours in this study. The incidence of these tumours in children has been observed to be high by many other workers although there are variations in their relative frequencies. For instance, the relative frequency of 13.3% for rhabdomyosarcoma in this study compares well with 14.3% reported in Benin18 and 13.1% reported in Jos14 whereas it differs from 7%, 6% and 0.7% reported in Calabar16, Ife15 and Ghana13 respectively.

Epithelial tumours are not common in the paediatric age group. A rising incidence however has been reported by some works.13, 18 Akhiwu et al18 working in Benin City Nigeria found 9 cases representing 10.7% of the malignant tumours in a 10-year study. Only 1 carcinoma was found in this study. Yolk sac tumour is a reportedly rare tumour of germ cell origin most commonly encountered in children or young women.22 We found 1 case in this study and it occurred in an 11-year-old girl.

In this study, benign tumours accounted for 80% of the tumours reviewed. The most common benign tumours were those derived from the breast which accounted for about 50% of all benign tumour the overwhelming majority being fibroadenoma. This fibroepithelial tumour derived from breast intralobular stroma, is the most common breast tumour in adolescent girls23-26 and all the cases in this study occurred in the adolescent age group. The high incidence of breast tumours in this study is a reflection of the breast cancer awareness and breast self-examination rate in our environment.

Tumours of connective tissue origin were next to breast tumours in frequency in this study about 40% of which is constituted by hemangioma. Hemangioma, the most
common tumour during infancy, was the most common tumour when Igbe et al. reviewed benign childhood tumours in Benin City, Nigeria. They make up about 7% of benign tumours during the childhood period and in the present series, they make up 11.6% all benign tumours reviewed. Other soft tissue tumours encountered in this study are not uncommon in the paediatric age group except for leiomyoma, a smooth muscle tumour most commonly encountered in the genitourinary and gastrointestinal systems of adults. Although rare in children, cases have been reported in this age group in different organs the including the skin and the bronchus. The present case occurred in the intestine.

Previous studies show that tumours generally are more common in the head and neck region. Although the reasons for this are not clear the high vascularity of this region has been suggested. The chest, however, was the most commonly affected body region in this series and this is as a result of the high incidence of fibroadenoma which make up 41.6% of benign tumours and one third of all tumours.

Conclusion

This study has shown that benign tumours constituted the majority of paediatric tumours in Warri, with tumours of the breast and connective tissues being the predominant benign tumours. Malignant tumours are relatively few with lymphoma as the most commonly encountered histological type.

References


Occurrence of mycoflora in staple grains on retail outlets in Kaduna and Nasarawa States of Nigeria.

Mokogwu ATH1, Onohwakpor EA2, Mokogwu EE 3

1Department of Chemical Pathology, Faculty of Clinical Medicine, Delta State University, Abraka, Nigeria
2Department of Obs-Gyn, Faculty of Clinical Medicine, Delta State University, Abraka, Nigeria
3Department of Agricultural Extension and Management, FCAHPT, NVRI, Vom, Nigeria

Abstract

Aim: Mycoflora and toxins from mould when found in grains can be harmful and even deadly when consumed by man. This work was designed to ascertain the presence and extent of growth of mycoflora in staple grains in Kaduna and Nasarawa States of Nigeria.

Methods: The staple grains (local variety) consisting of maize (Zea mays), beans (Cowpeas-Vigna simensis), groundnuts (Arachis hypogaea) and yam (Diascorea spp) were obtained from selected six Local Government Areas of the two States. Sampling was done twice; in dry and rainy seasons. Mycoflora isolation and identification were done by standard techniques.

Results: In rainy season, there was significant difference (p<0.001) in the mean of Aspergillus flavus and the rest fungi isolates in Kaduna and Nasarawa States. Also in dry season, there was significantly different (p<0.001) in the mean of Aspergillus flavus and the rest fungi isolates in both Kaduna and Nasarawa States. Equally in both Kaduna and Nasarawa States, there was significant difference (p<0.05) in the mean of fungi isolates in the four staple grains, with the mycoflora isolates in maize being the highest in the two States compared to the rest of the grains during rainy and dry seasons. Rainy and dry seasons comparison of the mean fungi isolates from the four grains’ samples shows no significant difference (p>0.05) in fungi isolates amongst the grains in both Kaduna and Nasarawa States.

Conclusion: The occurrence of Aspergillus flavus, Fusarium spp., Phoma spp., Fusarium moniliforme, A fumigates, A niger, Penicillium funiculosum and other toxigenic mycoflora in grains clearly shows the urgency for increased surveillance particularly as it constitutes great danger when consumed by humans.

Keywords: Mycoflora, occurrence, maize, beans, groundnuts, yam, Kaduna and Nasarawa States.

Introduction

Mycoflora most commonly known as fungi are actually moulds which infect crops in the field or during storage. Mould and toxins from mould when found in grains can be harmful and even deadly when consumed by man. Moulds usually grow under specific conditions of temperature and humidity or in disease / saturated soil1,2,3. Mouldy feeds may cause a variety of health problems in animal and humans especially respiratory diseases from breathing in mouldy spores3,4,5. Mouldy feeds are also less palatable and may cause a reduction in feed intake, resulting in weight loss. When moulds are shocked by sudden fluctuations in temperature (freezes or hot spells), they exude poisons called mycotoxins6,7. They suggested that individual moulds / mycoflora or more mycotoxins together may have a greater toxic effect than any one alone. Penn8 in 2004 stated that mycoflora could be considered nature’s garbage disposal. Without them, the term “biodegradable” would not be so significant to our planet and we would have mountains of leaves, dead trees and other organic materials sitting around us, all deposited since the beginning of time. Mould growth and mycotoxin production and contamination may also occur during mixing and delivery of grains and animal feeds. When produced on human foods or animal feedstuffs, mycotoxins constitute a potential toxic hazard which cause disease and reduced production5,9,10,11,12,13,10,14,15,16. Mycotoxicoses is the toxic disease...
caused by exposure to mycotoxins. The toxigenic mycoflora are not directly involved with the disease in the host and may no longer be present in the contaminated grains or foodstuffs. Each mycotoxin is produced by one or more very specific fungal species. In some cases, one species can form more than one mycotoxin for example the aflatoxins can be formed by Aspergillus flavus, Aspergillus parasiticus and limited other Aspergilli while Ochratoxin A is considered to be the main product of Aspergillus ochraceus in tropical regions and Penicillium verrucosum in temperate areas. WHO in 2002 stated that any crop or foodstuff that is stored for more than a few days is a target for mould growth and mycotoxin formation. EMAN in 2004, documented that the major commodities affected are cereals, nuts, dried fruits, coffee, cocoa, spices, oil seeds, dried peas and beans and fruits particularly apples. EMAN also in 2004 stated that mycoflora metabolic products may be found in beans, and wine resulting from the use of contaminated barley, other cereals and grapes in their production. These metabolic products enter the human food chain through meat or other animal products such as egg, milk and cheese as the result of livestock eating contaminated feed hence they cause a diverse range of toxic effects. Christensen in 1982 opined that chronic effects are of concern for the long-term health of the human population as some of the most common metabolites are carcinogenic, genotoxic or may target the kidney, liver or immune system. WHO in 2000 stated that National and International Organizations are constantly evaluating the risk that such metabolites pose to man. Gbodi et al. in 1986a isolated Fusarium spp and Neurospora spp and noted high levels of aflatoxin in maize in Plateau State of Nigeria. However, despite an initial interest generated, such research work has not been extended to other areas to ascertain the ever-increasing economic importance of mycoflora and their toxin producton in Nigeria. Therefore, this work was designed to ascertain the presence and extent of growth of mycoflora in maize, beans, ground nuts and yam on retail outlets in parts of Kaduna and Nasarawa States of Nigeria.

**Materials and Method**

Except where otherwise stated, all chemicals and solvent used in this work were of analytical grade as supplied by BDH Chemicals Ltd, Poole, England.

**Media/Reagents**

**Sterile Normal Saline:** Nine grammes (9g) of NaCl were dissolved in a litre of distilled water and autoclaved at 121°C for 15 minutes. This was allowed to cool on the bench and properly labeled. **Sabouraud’s dextrose agar (SDA):** Sixty-five grammes (65g) of SDA were suspended in a litre of distilled water and brought to boil to dissolve completely. This was then sterilized by autoclaving at 121°C for 15 minutes and 0.5g of chloramphenicol was aseptically added to the litre of the autoclaved cooled medium. About 20cm³ were dispensed into Petri dishes. Also, 5cm³ amount was dispensed into long test tubes plugged with cotton wool as slants. **Semi-synthetic medium:** Forty grammes (40g) of SDA were suspended in a litre of distilled water and prepared as stated above.

**Area of Study**

Kaduna and Nasarawa States, out of which six local government areas were selected. Kaduna: Jaba, Jamaa, Kaura, Lere, Sanga and Zango-Kataf. Nasarawa: Akwanga, Keffi, Lafia, Nasarawa-Eggon, Obi and Okona.

**Sample Grains**

Staple grains (local varieties) consisting of maize (*Zea mays*), beans (*Cowpeas-Vigna sinensis*), groundnuts (*Arachis hypogaea*) and yam (*Diascorea spp*) were obtained from the selected six local government areas’ retailed outlets in each of the States. About 2kg of each foodstuff were purchased from the selected six local government market outlets. Samples were done twice: Dry season, between the Months of September and February and at rainy season between March and August, from 1997 to 2005. All foodstuffs sampled were labeled, placed separately in a paper bag and kept under cool, dry conditions in order to prevent fungal growth or possible production of mycotoxin(s) (Jacobsen BJ et al.23).

**Fungi Isolation**

Method of Gabal MA et al. in 1994 was adopted. About 10g of visibly mouldy grains or ground/pulverized yam samples were placed in 250cm³ conical glass flasks with screw caps each containing 100cm³ sterile normal saline solution. The cap was screwed tight and later allowed to stand on the bench for 2mins. 1.0cm³ of the supernatant was further diluted 1:10 in clean sterile long glass test-tubes in sterile saline. The tubes were similarly shaken. Then 0.5cm³ each of the...
diluents were aseptically inoculated onto the surface of freshly prepared SDA plates containing 0.5g chloramphenicol/l to suppress the growth of any contaminating bacteria. The inoculum was evenly spread on the agar surface in a Petri dish with sterile loop. Plates were then incubated at 20°C incubator for 2-3 weeks.

Identification of Fungi (Mycoflora)
Fungi growth on plates were identified based on gross morphology and microscopy (25,26,27,28,) at the Federal College of Veterinary and Medical Laboratory Technology, National Veterinary Research Institute, Vom-Jos and at the Biotechnology Centre, Institute of Bioscience & Technology, Cranfield University, Silsoe Bedford, UK.

Statistical Analysis.
Statistical analysis was computed using SPSS (Statistical Package for Social Science) and Microsoft Excel Statistical Tool-Pack.

Results
The results of the mycoflora (fungal) isolates from the two States and in their individual grains are shown. Table 1 shows the mean of fungi isolated from the four foodstuffs during rainy season in the two States, while table 2 represents that of dry season. In rainy season, there was significant difference (p<0.001) in the mean of fungi labeled “a” (Aspergillus flavus) and those labeled “b” as well as those not labeled (the rest fungi isolates) in Kaduna and Nasarawa States (table 1). Also in dry season, there was significantly different (p<0.001) in the group of fungi labeled ‘a” and those labeled “b” as well as those not labeled in both Kaduna and Nasarawa States (table 2). Equally in both Kaduna and Nasarawa States, there was significant difference (p<0.05) in the mean of fungi isolates in the four foodstuffs (table 3), with the mycoflora isolates in maize being the highest in the two States (Kaduna-12.75 ±10.01; Nasarawa- 12.67 ± 6.14) compared to the rest of the grains during rainy season (table3) and Kaduna-13.29 ±9.75; Nasarawa-15.86 ± 8.02 at dry season (table 4). Rainy and dry seasons comparison of the mean fungi isolates from the four grains’ samples shows that there was no significant difference (p>0.05) in fungi isolates amongst the grains in both Kaduna and Nasarawa States (table 5). During the rainy season in Kaduna State, A. flavus was the highest mycoflora isolate followed by Fusarium spp., A fumigates, Fusarium moniliforme and A niger in that order (table 1).

Table 1: Mean of mycoflora isolates from the grains during rainy season in Kaduna and Nasarawa states
Fungi isolates in numbers

<table>
<thead>
<tr>
<th>State</th>
<th>KADUNA</th>
<th>NASARAWA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20.25±9.95</td>
<td>19.50±7.69</td>
</tr>
<tr>
<td>2</td>
<td>13.50±5.32</td>
<td>14.30±3.11</td>
</tr>
<tr>
<td>3</td>
<td>9.00±4.54</td>
<td>9.00±4.54</td>
</tr>
<tr>
<td>5</td>
<td>6.00±0.00</td>
<td>7.50±2.78</td>
</tr>
<tr>
<td>6</td>
<td>6.00±0.00</td>
<td>6.75±2.12</td>
</tr>
<tr>
<td>7</td>
<td>6.75±2.12</td>
<td>6.75±2.12</td>
</tr>
<tr>
<td>8</td>
<td>6.86±2.27</td>
<td>6.75±2.12</td>
</tr>
<tr>
<td>10</td>
<td>9.00±1.13</td>
<td>6.75±2.12</td>
</tr>
<tr>
<td>11</td>
<td>12.75±3.85</td>
<td>12.75±5.01</td>
</tr>
<tr>
<td>12</td>
<td>14.25±5.50</td>
<td>11.25±2.12</td>
</tr>
<tr>
<td>13</td>
<td>6.00±0.00</td>
<td>6.00±0.00</td>
</tr>
<tr>
<td>14</td>
<td>6.00±0.00</td>
<td>6.00±0.00</td>
</tr>
<tr>
<td>15</td>
<td>6.00±0.00</td>
<td>6.00±0.00</td>
</tr>
<tr>
<td>16</td>
<td>6.75±2.12</td>
<td>14.25±5.50</td>
</tr>
<tr>
<td>20</td>
<td>6.00±0.00</td>
<td>6.00±0.00</td>
</tr>
<tr>
<td>21</td>
<td>7.50±3.00</td>
<td>9.00±3.46</td>
</tr>
<tr>
<td>22</td>
<td>6.00±0.00</td>
<td>9.10±3.11</td>
</tr>
<tr>
<td>23</td>
<td>6.00±0.00</td>
<td>8.00±3.46</td>
</tr>
</tbody>
</table>

F-Value 8.53 9.10
P-Value p<0.001 p<0.001

Prevalence expressed as x ± STD per State while each number represents the Fungal isolates from all four foodstuffs: Maize, Rice, Yam and Cassava. P – values are assessed horizontally.

Note: Similar superimposed letters indicate means that are not significantly different from each other.

P < 0.001 = Very high significant difference.

While in dry season (table 2), also A. flavus has the highest frequency followed by Fusarium spp./Phoma spp., Fusarium moniliiforme, A. fumigates and A. niger in that order. Equally in Nasarawa State, A. flavus was the highest mycoflora isolate in wet season followed by Penicillium funiculosum, A. fumigates, Fusarium moniliiforme, Fusarium spp., and A. niger in that order (table 1), while at dry season, also A. flavus, was the highest mycoflora isolate, followed by Phoma sorghina, Fusarium spp., Phoma spp., A. fumigates, Cephalosporium spp., and Fusarium moniliiforme in that order (table 2).

Table 2: Mean of mycoflora isolates from the grains during dry season in Kaduna and Nasarawa States

<table>
<thead>
<tr>
<th>Fungi isolates in numbers</th>
<th>State</th>
<th>Kaduna</th>
<th>Nasarawa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>19.50±10.01</td>
<td>19.50±10.01</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>10.50±4.24</td>
<td>12.00±4.54</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>9.00±4.54</td>
<td>10.50±4.24</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>7.50±2.78</td>
<td>7.50±2.78</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>12.75±6.76</td>
<td>9.75±4.46</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>13.50±4.24</td>
<td>14.25±5.50</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>6.00±0.00</td>
<td>6.75±2.12</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>6.00±0.00</td>
<td>6.75±2.12</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>6.75±2.12</td>
<td>7.50±2.78</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>8.25±3.11</td>
<td>15.00±6.41</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>13.50±4.24</td>
<td>12.75±3.85</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>8.40±3.29</td>
<td>6.75±2.12</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>6.00±0.00</td>
<td>6.00±0.00</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>6.00±0.00</td>
<td>6.00±0.00</td>
</tr>
<tr>
<td>F-Value</td>
<td></td>
<td>5.93</td>
<td>5.74</td>
</tr>
<tr>
<td>P-Value</td>
<td></td>
<td>p &lt; 0.001</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

Prevalence expressed as $\bar{x}$ ± STD per State while each number represents the Fungal isolates from all four foodstuffs: Maize, Rice, Yam and Cassava. P – values are assessed horizontally.

Note: Similar superimposed letters indicate means that are not significantly different from each other.

P < 0.001 = Very high significant difference.

In Kaduna State the grain that is most highly vulnerable to fungal infestation, during the rainy season was maize followed by beans, groundnut and yam while in dry season maize was also the highest followed by groundnut, beans and yam (tables 3&4).

Table 3: Mean of mycoflora isolates from individual grains during rainy season in the two states

<table>
<thead>
<tr>
<th>States</th>
<th>Individual foodstuffs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maize</td>
</tr>
<tr>
<td>Kaduna</td>
<td>12.75 ± 10.00 ± 9.00 ± 6.46 ± 0.90</td>
</tr>
<tr>
<td>Nasarawa</td>
<td>12.67 ± 8.63 ± 10.33 ± 7.85 ± 1.99</td>
</tr>
</tbody>
</table>

Note:

Prevalence expressed as $\bar{x}$ ± STD per foodstuff in Adamawa and Benue States

P – values are assessed horizontally.

Similar letters indicate means that are not significantly different.

P > 0.005 = Not significantly different.
In Nasarawa State, maize was also the most vulnerable grain that is sensitive to mycoflora growth closely followed by groundnut, beans and yam at wet season and equally maize, groundnut, beans and yam during dry season (tables 3 & 4). There were also seasonal variations in the growth of some mycoflora. While *A. fumigatus* and *A. niger* were noted isolated during dry season, common mycoflora contaminants like *Rhizopus* spp. and *Syncephalastrum racemosum* were not isolated in Kaduna State at wet season.

### Discussion

Data on the occurrence of mycoflora in staple grains on retail outlets in Nigerian markets are scarce. From our findings, the high growth of *A. flavus, Fusarium moniliforme, Fusarium spp.*, and *Penicillium fumiculosum* as well as *Phoma spp.* in rainy and dry seasons in Kaduna and Nasarawa States are in agreement with the report of Gbodi TA et al.;22 who in 1986a and 1986b29 noted a very high growth of mycoflora in field and stored grains of maize and acha in Plateau State. Our findings also correlate with the work of Da-Silva JB et al.;15 who in 2000 in Brazil, observed high incidence of *A. flavus, Fusarium moniliforme* and *Fusarium spp.* in some agricultural grains. Also, our findings of high *A. flavus* is in line with the work of Gabal MA et al.;24 who in 1994 isolated a total of 103 *A. flavus* out of 150 agricultural commodities and animal feeds in Egypt. Blaney and Williams30 who in 199 in Australia observed that high summer temperatures, irregular rainfalls and insect damage are probably important factors in allowing *Aspergillus flavus* and *A. parasiticus* to invade summer crops in the field. Hell, K et al.;31 in 2000b equally noted that insect is important in the spread of *A. flavus* in pre-harvest maize. From our findings, the same may be true particularly with a climate that varies from equatorial in the South, tropical in the Central region to arid in the far North of Nigeria. There were also seasonal variations in the growth of some mycoflora particularly in Kaduna State which also has the highest isolates of *Aspergillus flavus*. Equally our findings of high growth of *Fusarium moniliforme* and *Fusarium spp.* are also in agreement with the assertion of Salifu32 who in 1981 and Agboola33 who in 1984 stated that *Fusarium spp.* are among the food spoilage moulds that commonly infect grains in Nigeria. Our findings that maize is perhaps more vulnerable to mycoflora growth is in line with the observation of Turner PC et

---

**Table 4: Mean of mycoflora isolates from individual grains during dry season in the two states**

<table>
<thead>
<tr>
<th>States</th>
<th>Individual foodstuffs</th>
<th>Maize</th>
<th>Beans</th>
<th>Groundnuts</th>
<th>Yam</th>
<th>F-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaduna</td>
<td></td>
<td>3.29 ± 10.15± 10.71 ± 7.64 ± 2.86</td>
<td>p &lt; 9.75± 4.51a 5.85a 2.80b 0.005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasarawa</td>
<td></td>
<td>15.86 ± 9.69 ± 9.86 ± 9.00 ± 2.50</td>
<td>p &lt; 8.02a 3.90b 6.49b 4.05b 0.005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Prevalence expressed as x ± STD per foodstuff in Adamawa and Benue States

P – values are assessed horizontally.

Similar letters indicate means that are not significantly different.

P < 0.005 = Significantly different.

P > 0.005 = Not significantly different.

---

**Table 5: Rainy and dry season comparison of the mean mycoflora isolates from the four grains in the two states.**

<table>
<thead>
<tr>
<th>Grains</th>
<th>Rainy</th>
<th>Dry</th>
<th>D. t – values</th>
<th>Df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaduna</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>12.75 ± 10.01</td>
<td>-0.84862</td>
<td>20</td>
<td>p &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>± 4.67</td>
<td>9.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>10.00 ± 9.15</td>
<td>0.51389</td>
<td>19</td>
<td>p &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>± 4.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundnuts</td>
<td>9.00 ± 4.56</td>
<td>0.18590</td>
<td>14</td>
<td>p &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>± 5.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yam</td>
<td>6.46 ± 7.64</td>
<td>0.32935</td>
<td>08</td>
<td>p &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>± 2.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasarawa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>12.67 ± 6.14</td>
<td>0.44740</td>
<td>27</td>
<td>p &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>± 8.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>8.63 ± 4.36</td>
<td>0.11058</td>
<td>22</td>
<td>p &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>± 3.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundnuts</td>
<td>10.33 ± 7.07</td>
<td>0.57132</td>
<td>19</td>
<td>p &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>± 6.49</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yam</td>
<td>7.85 ± 9.00</td>
<td>0.14050</td>
<td>13</td>
<td>p &lt; 0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>± 4.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** P < 0.005 = Significantly different.

P > 0.005 = Not significantly different
who in 2000 stated that maize is frequently infected with *Aspergillus spp.* in West African and also in tune with the work of Mashinini and Dutton, who in 2006 isolated *Fusarium spp.* in wheat and wheat based products in South Africa.

**Conclusion**

The presence of these toxigenic mycoflora in staple grains portends great danger when consumed by man and animals.

**References**

Open motorcycle wheel spoke achilles tendon injury among children in A Suburban African setting

Esezobor EE1, Awe OO1, Nwokike OO2, Amouzou KS2, Aighonoga QO1

1Plastic Surgery Unit, Department of Surgery, Irrua Specialist Teaching Hospital, Irrua, Edo state
2Burn and wounds care unit, Teaching Hospital Sylvanus Olympio, Lome University, Togo
3Department of Orthopaedic and Trauma, Irrua Specialist Teaching Hospital, Irrua, Edo State

Abstract

Introduction: Achilles tendon injury is commonly a sport-related closed injury in the developed countries, while in the developing countries; it is commonly an open vehicular accident related injury. The effect of the injury on children can have a long-term consequence if poorly managed.

Materials and Methods: This is a prospective study aimed at knowing the pattern of presentation and outcome of motorcycle-related Achilles tendon injuries among children in a rural hospital in Southern Nigeria between January 2010 and December 2015.

Result: A total of 28 patients who met the inclusion criteria were seen during this period. The male-to-female ratio was 1:3. Those mostly affected are primary school children within the ages of 6-10. The mean duration of hospital stay was 2.04±1.48 weeks. Most of the patients [85.7% (n=24)] achieved a power of grade 4 using the Medical Research Council Muscle Power Grading System scale at 1 year. The complication rate was 10.7% (n=3).

Conclusion: Those most at risk of motorcycle-related Achilles tendon injury are children of primary school ages. The outcome of primary repair and physiotherapy is encouraging.

Keywords: Achilles tendon, motorcycle wheel spoke, children, suburban

Introduction

The Achilles tendon is formed mainly by the gastrocnemius and soleus muscles. These muscles are the chief factors responsible for propulsion in walking, running and jumping.1 The Achilles tendon acts mainly at the push-off stage of walking and more so in running when the heel remains off the ground. Injury to this tendon will impact negatively on these actions.

Achilles tendon got its name from a warrior and hero of Homer’s Iliad who led the Greek military forces to capture and destroy Troy after killing the Trojan prince, Hector. He was immersed in river Styx by his mother, Thetis, as a way of protecting him from physical harm. However, the heel by which he was held during this process remained untouched by the water and thus his body had a vulnerable point. It was at this vulnerable area that Hector's brother, Paris, fired a poisoned arrow to avenge the death of his brother.2

In the developed countries where sporting activities are well organized, the commonly reported mechanism of Achilles tendon injury is a rupture during sport.3,4,5 They are mainly closed injuries. In developing countries, road traffic accident, from motorcycle and bicycle, is the commonest cause of open Achilles tendon injury.6,7 Other mechanisms that have been documented to be responsible for Achilles tendon injury are lacerations from broken glass, knives, cutlasses, axes, lavatory pans and rarely sharp edges of fractured bone segments.6,7,8,9,10,11

In rural Nigeria, there is no organized public transportation system. This coupled with the poor road networks which are not accessible to passenger cars and buses gave room to the escalating use of motorcycles as a means of transportation. Also, the alarming unemployment rate has made the youth to embrace commercial motorcycle transport as a business. There are studies that found the motorcycle as the most dangerous means of transportation with higher crashes and fatalities when compared to any other passenger vehicle per mile driven.12 For those who survives the crash, it is one of the commonest causes of limb loss.13 Despite these observations, the
use of motorcycle as a means of transporting children to school in the rural and suburban areas is becoming popular, thus putting the limbs of our future leaders at risk.14,15,16 [Fig 1]

Figure 1: A fresh open Achilles tendon injury

Materials and Methods

This is a prospective study of motorcycle spoke related Achilles tendon injury among children, seen in Irrua Specialist Teaching Hospital, Irrua, Edo State, Southern Nigeria between January 2010 and December 2015. The study centre is a 400-bedded hospital located in a rural area. The facility serves the people of Edo North and Central. It also serves some communities in the neighboring states of Kogi, Delta and Ondo.

After due ethical approval and informed consent collected from patients and their relatives, a structured proforma, filled by the first author and trained assistants (surgical residents) was opened for each patient at the time of presentation and updated during admission and follow-up clinic visit for one year. Data collected included patients’ demographics, side affected, surgical procedures carried out, type of cast used in immobilization, duration of hospital stay and complications. The outcome of treatment was also obtained at 1 year, using the Medical Research Council Muscle Power Grading System while patient attempts plantar-flexing the foot with the surgeon’s hand serving as a source of resistance when needed.

Excluded from this study are patients who were 18 years and above at the time of presentation, those that were lost to follow up before twelve-month post-treatment, Achilles tendon injuries not related to motorcycle accident and uncooperative patients.

Data obtained were analyzed using IBM-SPSS for windows (version 20.0 SPSS Inc., Chicago, IL) statistical software package; and presented in tabular and descriptive forms.

Result

A total of 28 patients who met the inclusion criteria were seen during this period. The average age of children affected was 9.89±4.41 years. The male-to-female ratio was 1:3. Those within the age group 6-10 years, and primary school children were mostly affected [59% (n=16)][fig 2a and b].

![Chart Showing Age distribution](chart.png)

**Fig 2a: Chart showing age distribution**

![Educational Level](chart2.png)

**Fig 2b: Educational Level**

![Duration between injury and time of surgery](chart3.png)

**Fig 3: Duration between injury and time of surgery**

The right limb was mostly affected, accounting for 67.9% (n=19) while the left limb accounted for 32.1% (n=9). The mean time interval between the injury and
commencement of surgery was 7.35± 7.09 hours. Majority of the patients had their surgery done within 6 hours from the time of injury [64.3% (n=18)] [Fig 3].

Modified Kessler tendon repair was used for all patients in this study. Direct edge to edge skin closure was possible in majority of cases [67.9% (n=19)] while the remaining 9 [32.1%] had reversed sural artery adipofascial flap with skin grafting. The mean duration of hospital stay was 2.04±1.48 weeks with majority of the patient spending one week on admission.

Table 1: Summary table for motorcycle related wheel spoke injury

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery School</td>
<td>2</td>
<td>7.1</td>
</tr>
<tr>
<td>Primary School</td>
<td>17</td>
<td>60.7</td>
</tr>
<tr>
<td>Secondary School</td>
<td>9</td>
<td>32.2</td>
</tr>
</tbody>
</table>

Mean age 9.89 ±4.41

Sex

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>21</td>
<td>75.0</td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>25.0</td>
</tr>
</tbody>
</table>

M: F= 1: 3

Side of injury

<table>
<thead>
<tr>
<th>Side of injury</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>19</td>
<td>67.9</td>
</tr>
<tr>
<td>Left</td>
<td>9</td>
<td>32.1</td>
</tr>
</tbody>
</table>

Skin cover surgery

<table>
<thead>
<tr>
<th>Skin cover surgery</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-Direct skin closure</td>
<td>19</td>
<td>67.9</td>
</tr>
<tr>
<td>B-Reverses rural artery flap</td>
<td>9</td>
<td>32.1</td>
</tr>
</tbody>
</table>

Mean duration of cast 5.41±1.55 weeks

Outcome

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRC-3</td>
<td>4</td>
<td>14.3</td>
</tr>
<tr>
<td>MRC-4</td>
<td>24</td>
<td>85.7</td>
</tr>
</tbody>
</table>

Mean MRC= 3.81± 0.40

Complication

<table>
<thead>
<tr>
<th>Complication</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>25</td>
<td>89.3</td>
</tr>
<tr>
<td>Wound breakdown</td>
<td>2</td>
<td>7.1</td>
</tr>
</tbody>
</table>

Table 1: Summary table for motorcycle related wheel spoke injury

<table>
<thead>
<tr>
<th>Infection</th>
<th>Frequency (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot and above-the-knee casting</td>
<td>1</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Discussion

Most epidemiological studies on Achilles tendon injury are from developed countries and are frequently sport related.3,4,5,16 Raikin et al.18 observed that among 406 consecutive cases of Achilles tendon injury, 68% were sport-related. Other studies by Cetti and Postacchini observed 83% and 44% respectively.4,5 In rural and suburban Nigeria, closed sport-related injuries like Achilles tendon rupture are hardly seen in the trauma departments because of poverty and ignorance of the rural dwellers. They are of the belief that closed musculoskeletal injuries are not severe enough to warrant hospital treatment, thus, patronizing the traditional bone setters.19

The motorcycle spoke is the commonest cause of Achilles tendon injury in our setting. Of the 57 patients we managed during the study period for Achilles tendon injuries, 31 were caused by motorcycle spoke of which 28 met the inclusion criteria.

In Nigeria, organized mass public transportation system is non-existent especially in the rural areas. Despite the dangers of commercial motorcycles, it is becoming the major means of moving persons and goods in rural and suburban communities. Dongo et al13 reported that motorcycle-related accidents inflictedmore injury to the lower limb than to any other part of the body. The passenger seated astride this means of transportation, puts his or her heel at the risk of being trapped between the spokes in the wheel of an unstable motorcycle, in the event of a bumpy ride.

Our study reveals that children between the ages of 6-10 years are mostly affected. These are mainly children at the primary level of education. This finding is at variance with other studies on Achilles tendon injuries where those in the third and fourth decades are mostly
affected.\textsuperscript{16,17} For children, their susceptibility to this injury stems from the observation that the motorcycles are overcrowded while taking a ride to and back from school, thus leaving the kids scampering for spaces on the foot rest [Fig 5].

During a bumpy ride, the heel of the hanging limb, when the knee is inadvertently flexed, may be drawn and trapped between the spokes of the moving wheel leading to avulsion of the Achilles tendon. All the cases that presented to our facility were open, and with ragged skin edges.

We observed a female preponderance in our study as against some other studies on Achilles tendon injury from sport where the males are mainly affected.\textsuperscript{17,18} This may not be unconnected with the bogus skirts, gowns and wrappers which are the traditional dressings for females in our setting. These dressings may be entrapped within the moving wheel and consequently drag the foot towards the spokes, thus, causing the Achilles tendon entrapment and injury. Most of our patients corroborated this hypothesis in their history.

The right lower limb is mostly affected; this is in contrast with other studies done on Achilles tendon injury.\textsuperscript{18-20} All the patients in this study had open injury. There was no case with bony involvement.

Some controversy exists concerning the distribution of blood supply to the Achilles tendon: While some opine that the density of blood vessels is low towards the distal part,\textsuperscript{23} others are of the opinion that the blood vessels are evenly distributed.\textsuperscript{24} However, the blood supply to the Achilles tendon is better in younger individuals.\textsuperscript{25} Based on this information, the preferred technique to be employed in repairing the Achilles tendon should not worsen the already precarious blood supply due to anatomy and the injury. The modified Kessler suturing technique was used in all cases. This is a simple and time-efficient technique that will allow the preservation of blood supply. There were no records of cases requiring tendon flap. [Fig 6]

Skin cover for the distal leg and foot is a challenge. Though direct end-to-end skin closure was possible in most cases, there were some patients requiring flap cover of which the reverse sural artery fasciocutaneous flap was used. Unlike the reverse sural artery fasciocutaneous flap where skin from the calf is taken along with the flap, this has the cosmetic advantage of confining the resultant scar within the boundary of the school sock. [Fig 7a and b]
We achieved post-operative immobilization with boot cast for most patients except for suspected active children when we used above-the-knee cast to reduce their activity. This is to allow for progression of wound healing. These were maintained for 6 weeks, after which patients were allowed gradual weight bearing under the supervision of the physical therapist. Though most of our patients attained an MRC grade 4 at 1 year, the outcome of our treatment can be better if we have a well-equipped physiotherapy unit.

The commercial motorcycle related Achilles tendon injuries are preventable. Effort should be made by the Standards Organization of Nigeria (SON) to modify the design by way of encasing the wheel spokes. Also, education of motorcycle riders and enforcement of road safety laws should be taken to the grassroots. This will curb the incessant overloading of commercial motorcycles and the resultant accidents in our rural areas. Provision of a proper transportation system and good schools, located at trekkable distance, for the children will go a long way to prevent this injury.

**Conclusion**

While most reported Achilles tendon injuries in advanced countries are spontaneous, closed and related to sporting activities, our study has revealed the prevalence of open motorcycle wheel-related injury in our rural/sub-urban setting. Females of primary school ages are mostly affected. Early open repair gives a better outcome. Proper attention should be paid to rehabilitation and skin cover to achieve good function and aesthetics.

**References**

Pattern of request for female fertility hormonal assay in Irrua Specialist Teaching Hospital (ISTH) Irrua, Edo State. Nigeria: One year retrospective study.

AdebayoKJ\textsuperscript{1,2}, Osuji KC \textsuperscript{2}

\textsuperscript{1}Department of Chemical Pathology, Faculty of Clinical Sciences, College of Medicine, Ambrose Alli University, Ekpoma, Edo State, Nigeria.
\textsuperscript{2}Department of Chemical Pathology, Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria.

Abstract
Requests for infertility work up are often received in the chemical pathology laboratory. These are sent in from various consultants in the hospital and even from private clinics. There is ever increasing need to assist the infertile or sub fertile couples to achieve pregnancy or sexual satisfaction. We set out to find out which gender is being investigated more in this environment and from where do the requests come. A retrospective study of the master log book in the chemical laboratory was done for a period of one year (January – December 2014). The result shows that only 6\% of males compared with 94\% of females are being investigated in our laboratory. The excel software was used in the analysis of result. Females are being selectively investigated but in our opinion, this should stop and both partners should be investigated together to achieve better result.

Keywords: Infertility, Male factor, Female factor, Hormones, Fertility

Introduction
The quest for procreation is as ancient as the history of man. In many cultures, for a marriage to be seen as successful, it must be blessed with pregnancy and childbirth. For those not interested in childbearing however, they aim at sexual satisfaction among other reasons for marital union. No wonder then that help is quickly sought when either or both of the above reasons for getting married is/are not achieved as at when due in the union.

The gynecologist, surgeon (General or Urologist), General practitioner, Family physician, endocrinologist and the Chemical pathologist with attendant in Chemical Pathology laboratory are often contacted variously for help or assistance.

The control of the gonads, fertility and sexual behavior in humans is multifactor and this article will be concerned primarily with the hormonal control. Gonadotrophin releasing hormone (GnRH) produced and secreted in the hypothalamus acts on the anterior pituitary gland which results in the production and release of Follicle Stimulating Hormone (FSH) and Luteinising Hormone (LH). These in turn act on either the testis (males) or ovary (females) to elaborate needed sex hormones. This process is regulated by hormonal and neuro-psychological mechanisms.

Any malfunction in the above stated mechanisms despite good or normal anatomy of the couple can result in sexual dysfunction and infertility.

Literature review
Infertility is defined as a couple’s inability to conceive after 1 year of regular unprotected sexual intercourse, it is a condition which affects approximately 15\% of the reproductive age population\textsuperscript{1,2}. A contributing male factor may be found in over half of cases with up to 40\% of those being secondary to male factors alone\textsuperscript{2,3}. Male factor infertility is often characterized by abnormalities on semen analysis such as low or absent sperm counts and low motility. The diagnostic ability of available male investigative tools is limited, however, and likely underestimates the true prevalence of male factors in infertile couples. The World Health...
Organization stated that infertility is a major global public health issue of the last few decades. Infertility is estimated to affect about 72.4 million people worldwide with 40.5 million currently seeking medical care. The overall burden of sub fertility infertility is significant; it is likely underestimated, and has not displayed any decrease over the last 20 years. The fertility evaluation is typically initiated for couples who have been trying to conceive naturally for some period of time without success.

They should first undergo an evaluation to determine any barriers or available treatments for their best opportunity to conceive naturally.

### Table 1: Reference values of male reproductive hormones

<table>
<thead>
<tr>
<th>Hormone (units)</th>
<th>Normal reference range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testosterone, bio available (ng dl⁻¹) Total testosterone (ng dl⁻¹) &gt;20 years</td>
<td>240–950</td>
</tr>
<tr>
<td>20–39 years</td>
<td>72–257</td>
</tr>
<tr>
<td>40–69 years</td>
<td>40–213</td>
</tr>
<tr>
<td>Testosterone, free (ng dl⁻¹)</td>
<td>20–39 years 1.4–20.3</td>
</tr>
<tr>
<td>40–69 years</td>
<td>0.6–16.8</td>
</tr>
<tr>
<td>Estradiol adult (pg ml⁻¹)</td>
<td>11.6–41.6</td>
</tr>
<tr>
<td>Follicle stimulating hormone adult (mIU ml⁻¹)</td>
<td>0.9–15</td>
</tr>
<tr>
<td>Luteinizing hormone adult (mIU ml⁻¹)</td>
<td>1.3–13</td>
</tr>
<tr>
<td>Inhibin B (pg ml⁻¹)</td>
<td>47–308</td>
</tr>
<tr>
<td>Prolactin (ng ml⁻¹)</td>
<td>2–15</td>
</tr>
</tbody>
</table>

### Table 2: Male reproductive hormone evaluation profile as related to clinical condition

<table>
<thead>
<tr>
<th>Clinical condition</th>
<th>Folliclestimulating H</th>
<th>Luteinizing H</th>
<th>Testosterone</th>
<th>Prolactin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal spermatogenesis</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Abnormal spermatogenesis</td>
<td>High</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Hyponogadotropic hypogonadism</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Normal</td>
</tr>
<tr>
<td>Hypergonadotropic hypogonadism /completelytesticular failure</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Normal</td>
</tr>
<tr>
<td>Prolactin-secretingpituitary tumor</td>
<td>Normal</td>
<td>Normal</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

### Evaluation of reproductive failure

Clinical assessment of male reproductive failure represents a great challenge. Several factors (environmental, therapeutic, genetic, occupational, etc.) are responsible for male reproductive failure. These factors primarily affect the hypothalamic-pituitary-gonadal (HPG) axis, which results in hormonal imbalance and testicular damage causing reproductive failure and infertility.

### Endocrine evaluation

An endocrine evaluation of an infertile male should be performed to check: (1) an abnormal testicular size and/or pathology; (2) abnormal semen parameters; (3) impaired sexual function; (4) other clinical findings suggestive of a specific endocrinopathy. Initial evaluation should include levels of serum testosterone (T), luteinizing hormone (LH), follicle stimulating hormone (FSH), inhibin and also prolactin (if erectile dysfunction is suspected). Table 1 gives the reference values of these male reproductive hormones. A woman with a suspicion of chronic anovulation most probably due to polycystic ovarian (PCO) syndrome, as there is a long history of irregular cycles and clinical presentation with hirsutism, her serum levels of testosterone hormone, sex hormone binding globulin (SHBG), dihydroepiandrostenedione (DHEA), dihydroepiandrostenedione-sulfate (DHEAS) and prolactin should be evaluated to prove the provisional diagnosis and to detect the source of excess androgens. However, early referral of infertile couples to a dedicated specialist infertility clinic may be indicated to increase their chance of pregnancy. Other necessary tests as for male endocrine evaluation above should be carried out.

### Method

After adequate consultation, necessary data was retrieved from the master result log book in the Chemical pathology laboratory of ISTH, Irrua, Edo state, Nigeria. The period analysed was from January 1, 2014 to December 31, 2014. Retrieved data included sex, clinical diagnosis and the referring clinic. The data was de-identified to protect the patients/clients. Analysis was by Excel software package and same presented as tables and figures.
JABS Adebayo, Osuji; Pattern of request for female fertility hormones in Irrua Specialist Teaching Hospital (ISTH) Irrua, Edo State. Nigeria. One year retrospective study.

Result

A total of 444 requests were received out of which males were 28 accounting for 6.3% (28/444) and females were 416 accounting for 93.7% (416/444).

Table 3: No of requests per month and gender

<table>
<thead>
<tr>
<th>Month</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>February</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>March</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td>April</td>
<td>5</td>
<td>86</td>
</tr>
<tr>
<td>May</td>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>June</td>
<td>3</td>
<td>52</td>
</tr>
<tr>
<td>July</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>August</td>
<td>6</td>
<td>70</td>
</tr>
<tr>
<td>September</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>October</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>November</td>
<td>6</td>
<td>57</td>
</tr>
<tr>
<td>December</td>
<td>1</td>
<td>44</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>416</td>
</tr>
</tbody>
</table>

Fig. 1a: Pie Chart showing the diagnoses necessitating investigation in Males

Fig. 1b: Bars showing the diagnoses necessitating investigation in Males

Table 3: No of requests per month and gender

Fig. 2: Clustered column showing the reasons for requesting female fertility profile

Fig. 3: Requesting clinics for male fertility profile

Fig. 4: Requesting clinics for Female fertility profile
Discussion

Despite the fact that male factor accounts for about 40% of the causes of infertility, only about 6% males compared with about 94% of females are being investigated in the chemical pathology laboratory in this center for the given period reviewed. This agrees with the widely-held belief in many cultures that infertility is often due to female factor.

Infertile couples are usually advised to start their investigations after 12 months of trying to conceive or after 6 months if the female partner is more than 35 years old or immediately if there is an obvious cause for their infertility or subfertility.

Infertility is a common clinical problem. It affects 13% to 15% of couples worldwide. The prevalence varies widely, being less in developed countries and more in developing countries where limited resources for investigation and treatment are available. In the United Kingdom, it is estimated that one in six couples would complain of infertility.

Both partners should be investigated at the same time to achieve better result and there should be proper counseling by the attending physician or gynecologist.

Conclusion

This study has shown that males are not being investigated for infertility in this center as often as females. All efforts should be geared towards educating males at all referring or contact points. This type of education is necessary in order to assist appropriately when investigating couples for infertility.

References

Perception and use of labour analgesia among antenatal attendees in a sub urban Nigerian population

Omoregbee HI, Eifediyi RA, Eigbefoh J, Momoh M, Oriaifo N.

Department of Obstetrics and Gynaecology, Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria.

Abstract

Introduction: Labour pain is the result of many complex interactions, physiological and psychological, excitatory as well as inhibitory. The severity of labour pain varies greatly among women in labour and the mechanism and perception depends on the stage of labour as well as birth preparedness. Over the years, various methods have been used to achieve pain free labour. However, an ideal method that will provide rapid, effective and safe pain relieve in labour, is difficult to find in medicine.

Objectives: The aim of the study was to determine the level of awareness, perception and desirability and use of analgesia during labour.

Materials and Methods: This was a descriptive cross-sectional study carried out at Irrua, Edo State on 307 patients who met the inclusion criteria during the study period using the McGill pain questionnaire.

Results: Of the 307 respondents, 46 (15%) were aware of the use of analgesia during labour through literatures, lectures and symposia (58.8%). Two hundred and forty-four of the women (79.5%) were desirous of analgesia use in labour and the preferred method was intramuscular opioids (112(45.9%). Interestingly, 40.3% of the parturient did not want analgesia in labour because of their belief and God’s will for them in 35.5% of the women.

Education, occupation and parity had statistically significant association with the knowledge and desire of use of analgesia in labour (education (p = 0.004), occupation (p = 0.016) and parity (p = 0.025).

Conclusion: Education and high skilled occupation played important role in the knowledge and the desire for use of analgesia in labour. Therefore, continuous public enlightenment is advocated to reduce cultural misconception about the use of analgesia. This will go a long way in promoting the uptake of analgesia in labour.

Keywords: Analgesia, Labour, Perception

Introduction

Childbirth is a process which from time immemorial has been accompanied by pain experienced by the mother. The Bible states, concerning the woman, that “in sorrow thou shalt bring forth children”. It is often characterized with fears and anxiety resulting mostly from the associated painful experience.

Pain is defined as an unpleasant, subjective, sensory and emotional experience associated with real or potential tissue damage, or described in terms of such damage. So many factors might contribute to pain in labour that a specific aetiological diagnosis of the causes of such pain is difficult.

Labour pain is the result of many complex interactions, physiological and psychological, excitatory as well as inhibitory. Pain during the first stage of labour is due to distention of the lower uterine segment, mechanical dilatation of the cervix and lastly due to stretching of excitatory nociceptive afferents resulting from the contraction of the uterine muscles. The severity of pain parallels with the duration and intensity of contraction. In the second stage, additional factors such as traction and pressure on the parietal peritoneum, uterine ligaments, urethra, bladder, rectum, lumbosacral plexus, fascia and muscles of the pelvic floor increase the intensity of pain.

The severity of labour pain varies greatly among women in labour. If women are asked during or shortly after birth to score their labour pain, most rate it as
severe while few mention little or no pain\textsuperscript{9,10}. Using the McGill pain questionnaire, Melzack et al\textsuperscript{10} in Montreal, Canada, found out that labour pain was usually rated with a high score particularly among primiparae, especially those with a history of dysmenorrhea and those belonging to low socio-economic status\textsuperscript{9}. The effects of severe pain are principally a sympathetic autonomic response and include exhaustion, dehydration, misery, elevated heart rate, blood pressure, oxygen and glucose consumption, decreased blood flow and oxygen to placenta and fetus, hyperventilation and cramps. Obviously in many individuals such effects are undesirable and in some may even be life-threatening\textsuperscript{11}. Despite these recognized adverse effects of pain in labour, the issue of analgesia in labour remains a controversial topic because of difference in ethnicity, illiteracy, lack of knowledge and poverty.

James Young Simpson in 1847\textsuperscript{11} stated that “the distress and pain women often endure while they are struggling through a difficult labour are beyond description, and seem to be more than human nature would be able to bear under any other circumstances. Medical men have opposed for a long time the use of andgesia and anaesthesia in labour but a time will come when the parturients enforce its use upon the profession as a matter of right\textsuperscript{11,12}. These statements are still most pertinent, as they encapsulate today’s widely held view of both parturients and most perinatal care providers. First, because most of today’s laboring women do not want to suffer severe pain, and more importantly they know that it is no longer necessary to do so.

**Literature Review**

Pain relief management during labour has undergone various advancements since 1847, when Simpson found out that chloroform could help relieve the pain women felt during labour. His findings were not received favourably on religious and medical grounds\textsuperscript{13}. Childbirth was viewed as a physiological process best managed with as little interference as possible \textsuperscript{14,15}.

Over the years, various methods have been used in an attempt to achieve a pain-free labour\textsuperscript{16}. Psychological, physical and pharmacological methods of pain relief are utilized depending on the patient’s choice and expertise of the care giver. Examples of these various methods include, psychoprophylaxis\textsuperscript{17,18}, hypnosis\textsuperscript{19}, for the psychological methods; transcutaneous electrical nerve stimulation (TENS), acupuncture\textsuperscript{20,21} and hydrotherapy\textsuperscript{22,23} for the physical methods; and the use of opioids (pentazocine, pethedine, and fentanyl)\textsuperscript{24} either systemically or regionally (epidural)\textsuperscript{25,26}, and inhalational agents\textsuperscript{27} for the pharmacological methods.

The ideal analgesic technique in labour should provide rapid, effective and safe pain relief for all stages of labour, not compromise maternal vital physiology or normal activity not compromise fetal vital physiology or well-being, not hamper the normal processes of labour, be flexible enough to convert to anaesthesia for urgent operative delivery or other intervention, e.g. manual removal of placenta. Meeting such an ideal would leave the mother awake, alert, comfortable and able to void, bear down, and, if desired, even ambulate throughout labour. Unfortunately, such ideals are rarely met in medicine, but for the past twenty years the development of low-dose neuraxial anaesthesia and analgesia (epidural and combined spinal-epidural (CSE)) have been recommended\textsuperscript{11}.

While the practice of obstetric analgesia has become almost routine in the developed world, many parturients in the developing world are still unaware that labour could be pain-free. The level of awareness of the various methods of pain relief in labour amongst Nigerian parturients is still relatively low. In a study conducted at the University College Hospital, Ibadan, in 2000, only 27.1% of patients were aware of pain relief methods\textsuperscript{28}. It is not unusual in many settings, for laboring women to be left unattended to while experiencing the agonizing pain of childbirth. Presently, many health care institutions in Nigeria lack a protocol for the management of labour pain despite the overwhelming evidences of its usefulness\textsuperscript{17,18}. Lack of manpower and cost of care are some of the reasons given for this poor practice\textsuperscript{17}.

A study conducted amongst pregnant women in South Western Nigeria, revealed that most women desire the elimination of labour pain\textsuperscript{18}. The patient’s choice of a medical intervention in preventing labour pains is dependent mainly on the level of awareness about the significance of such a method\textsuperscript{29}. The low level of awareness and desirability of analgesia in labour is attributed by some investigators

\textsuperscript{11}Omoregbe, Perception and use of labour analgesia among antenatal attendees in a sub-urban Nigerian population.
to the prevalent educational level, socioeconomic status, cultural and religious inclinations of women in Nigeria. The attitude to pain relief in labour may also be influenced by a woman’s upbringing. Culture, ethnic group and age might be strong influences. In the third world, especially in Africa, access to knowledge and the availability of medical care could influence attitudes to pain relief.

The aim of this study is to determine the level of awareness and the factors influencing this, as well as the desirability of analgesia during childbirth amongst antenatal patients in the Irrua Specialist Teaching Hospital in order to make informed recommendations that would facilitate the practice of obstetric analgesia in this center.

Materials and Methods

Study Area

The hospital is a tertiary public health institution that serves the three senatorial districts in Edo State particularly the Edo Central senatorial district with an estimated population of 550,000-700,000. It also serves as a major referral centre for patients from Delta, Ondo and Kogi States.

Study Population: The Patients attending antenatal clinics were recruited for the study

Inclusion criteria: Pregnant women in the 3rd trimester of pregnancy

Exclusion criteria:
1) Primigravidae
2) Women in 1st and 2nd trimester
3) Women already in confirmed Labour
4) Women who declined

Study Design: Descriptive cross-sectional study was used.

Sample Size Determination: The number of women who deliver in the Irrua Specialist Teaching Hospital each year is about 1000. The required sample size was determined using a standard statistical formula \( n_f = n / (1 + n/N) \) where \( n_f \) is the desired sample size when population is less than 10,000; \( n \) is the desired sample size when the population is more than 10,000 and \( N \) is the estimation of the population size) and marked upwards in order to obtain a better representative sample. Three hundred and seven women completed the questionnaires satisfactorily during this period.

Sampling Method

A total population sampling was done based on the availability of women attending the antenatal clinic in Irrua Specialist Teaching Hospital, Irrua. Respondents were chosen from a number of antenatal clinic sessions until the desired sample size was achieved. For each clinic session, before commencement of the clinic, numbers were assigned to the patients. However, all the patients attending antenatal clinic were interviewed.

Study Duration

5 months (April – August 2015)

Data Collection

Patients attending antenatal clinics during this period responded to a structured questionnaire after giving their consent to the interviewer who intimated them on the purpose of the study. The questionnaire was structured in four parts: sections on socio-demographic profile, knowledge of obstetric analgesia, attitude towards the use of analgesia in labour and desirability of analgesia in labour.

Data Analysis: Statistical analysis was performed using the International Business machines Statistical Package of Social Science (IBM SPSS) 22.0 version software. Bivariate analysis was used to explore the effect of socio-demographics on the dependent variables (awareness and desirability of analgesia) using the Pearson's Chi square test. The statistical significance was set at 95% confidence level.

Ethical Consideration: Approval for the study was obtained from the ethical committee of the Irrua Specialist Teaching Hospital. Ethical considerations in this study will be based on the general ethical principles as applicable to human subjects. These are respect for persons, beneficence, non-malficience and justice.

Results

A total of 307 women completed the interviewer structured questionnaires satisfactorily. The analysis of the collated data was presented in simple frequencies, percentages, tables, charts, cross-tabulations and the
corresponding Chi-squares and logistic regression tables as follows:

Table I: Socio-Demographic Characteristics of Respondents

<table>
<thead>
<tr>
<th>Years</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-22</td>
<td>19</td>
<td>6.2</td>
</tr>
<tr>
<td>23-27</td>
<td>81</td>
<td>26.4</td>
</tr>
<tr>
<td>28-32</td>
<td>131</td>
<td>42.7</td>
</tr>
<tr>
<td>33-37</td>
<td>54</td>
<td>17.6</td>
</tr>
<tr>
<td>38-42</td>
<td>22</td>
<td>7.2</td>
</tr>
<tr>
<td>Total</td>
<td>307</td>
<td>100</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>34</td>
<td>11.1</td>
</tr>
<tr>
<td>Student</td>
<td>39</td>
<td>12.7</td>
</tr>
<tr>
<td>Artisan</td>
<td>57</td>
<td>18.6</td>
</tr>
<tr>
<td>Trader</td>
<td>93</td>
<td>30.3</td>
</tr>
<tr>
<td>Professional</td>
<td>60</td>
<td>19.5</td>
</tr>
<tr>
<td>Health Worker</td>
<td>24</td>
<td>7.8</td>
</tr>
<tr>
<td>Total</td>
<td>307</td>
<td>100</td>
</tr>
<tr>
<td>Level of Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal Education</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Primary</td>
<td>44</td>
<td>14.3</td>
</tr>
<tr>
<td>Secondary</td>
<td>107</td>
<td>34.9</td>
</tr>
<tr>
<td>Post secondary</td>
<td>155</td>
<td>50.5</td>
</tr>
<tr>
<td>Total</td>
<td>307</td>
<td>100</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>94</td>
<td>30.6</td>
</tr>
<tr>
<td>2-4</td>
<td>167</td>
<td>54.4</td>
</tr>
<tr>
<td>5 and above</td>
<td>46</td>
<td>15.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>307</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Age is categorized into 5-year age groups from 18-22; 23-27; 28-32; 33-37; and 38-42 years.

Patients aged 28-32 years constituted the highest number, with 131 patients (42.7%); followed by the group aged 23-27, with 81 patients (26.4%). The age group 18-22, was the lowest, with 19 patients (6.2%), closely followed by the group of 38-42 which had 22 patients (7.2%). The mean of the individual ages was 29.58 years, the mode was 28 years and the median was 29 years.

Regarding the occupation, most of the respondents, 93 (30.3%), were traders; only 24 (7.8%) patients were in the health sector; 39 patients (12.7%), were students, while 34 (11.1%), were unemployed.

Regarding the level of education, majority (50.5%) of the respondents had postsecondary level of education.

Table 1 also showed the parity distribution of the patients. Ninety-four patients (30.6%) were primiparas; 167 (54.4%) were multiparas and 46 (15.0%) were grandmultiparas.

NB: Of the 94 primiparas, 2 had Elective Caeserean delivery in their previous confinement

Table 2: Previous Experience of Labour Pain

<table>
<thead>
<tr>
<th>Degree of pain</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>159</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>221</td>
<td></td>
</tr>
</tbody>
</table>

Greatest concern during labour

<table>
<thead>
<tr>
<th>Safe delivery of baby</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour pain experienced</td>
<td>40</td>
<td>18.1</td>
</tr>
<tr>
<td>Her health</td>
<td>16</td>
<td>7.2</td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td>1.4</td>
</tr>
<tr>
<td>Total</td>
<td>221</td>
<td>100</td>
</tr>
</tbody>
</table>

Two hundred and twenty-one of the 307 women who were interviewed had experienced labour pains at least once. 72% (159) of these women considered the labour pains they had experienced to be severe; 24.4% (54) considered the pains as moderate. Only 3.6 (8) felt that the pains were mild.

The table also showed the greatest concern expressed by patients during previous labour experiences. 162 (73.3%) of the patients were most concerned about the safe delivery of the baby; 40 (18.1%) were most concerned about the labour pain experienced; 16 (7.2%) were most concerned about their own health, while 3 (1.4%) admitted to not having any particular concern during labour. Table 2 also displayed the level of knowledge of analgesia during labour amongst the patients.

Eighty-five percent of the patients (261) had no knowledge of analgesia in labour. Fifteen percent (46) knew about analgesia in labour.

It showed that 27 (58.8%) of the knowledgeable patients got to know about obstetric analgesia from “other sources” which included literatures, lectures in schools and symposia. Thirty point four percent of the knowledgeable patients got to know about obstetric analgesia while attending the antenatal clinic and from...
other health personnel at other times. 6.5% of the patients acquired the knowledge from friends or family members. The media accounted for only 4.3% of source of knowledge.

Table 3 showed the choices of the different methods of analgesia preferred by the patients. Most women, 112(45.9%), preferred the intramuscular opioid injection. 69(28.3%) of the women desirous of analgesia in labour were uncertain of the method they wanted. In their opinion, they would want the doctor to use whatever method he considered to be the best since they did not have afore knowledge about the topic. 29(11.9%) of the women wanted epidural analgesia; 14 (5.7%) wanted inhalational analgesia, while 20(8.2%) of the women preferred other forms of pain relief in labour which included companionship in labour and having their backs rubbed during contractions.

Table 4 is a bivariate analysis table of the knowledge of analgesia and the choice of method of analgesia amongst the patients. It showed the total number of patients who lack knowledge of obstetric analgesia and what method of analgesia they preferred respectively. It also showed the data for those patients who were previously aware of obstetric analgesia and methods of analgesia they preferred. Of note was that 10.9% of patients who were aware of analgesia in labour did not want any form of analgesia; while amongst those who previously were not aware that labour could be pain free, only 22.3% did not desire analgesia in labour after being informed that labour could be pain free. The preferred method of obstetric analgesia amongst those with a fore knowledge of the topic was the epidural analgesia, 41.3%; while intramuscular opioid injection was the preferred method, 37.2%, amongst those who previously were not aware of analgesia in labour. Overall, the most preferred method of analgesia in labour was the intramuscular opioid injection with 36.5% of the total number of patients desiring this method of analgesia. Inhalational analgesia was the least preferred method, with a total of 14 patients, 4.6%, opting for this method.

Bivariate analysis between the awareness of respondents about the use of analgesia in labour and the preferred method of analgesia revealed a statistically significant association (p = 0.000).

Table 5 showed the various reasons why some women were not desirous of analgesia in labour. The greatest percentage of women, 40.3%, was of the belief that experiencing labour pains was part of being a woman.
35.5% were not desirous of analgesia in labour because they believed that it was God’s will for a woman to experience labour pains. 14.5% were not desirous of analgesia in labour because of the fear of possible side effects on the baby and their health. 3.2% of the women wanted to experience labour pains for the first time. 6.5% gave other reasons for not wanting analgesia in labour which included being able to tolerate the pain of labour.

Table 5: Reasons for not wanting analgesia in labour

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour pain is the will of god</td>
<td>22</td>
<td>35.5</td>
</tr>
<tr>
<td>It is part of being a women</td>
<td>25</td>
<td>40.3</td>
</tr>
<tr>
<td>Fear of side effects</td>
<td>9</td>
<td>14.5</td>
</tr>
<tr>
<td>Desirous of the experience</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Others</td>
<td>74</td>
<td>6.5</td>
</tr>
<tr>
<td>Total</td>
<td>6265</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 6: Use of Analgesia in labour

<table>
<thead>
<tr>
<th>Use of analgesia in Labour</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses</td>
<td>200</td>
<td>65.1</td>
</tr>
<tr>
<td>No</td>
<td>107</td>
<td>34.9</td>
</tr>
<tr>
<td>Total</td>
<td>307</td>
<td>100</td>
</tr>
</tbody>
</table>

From table 6 majority (65.1%) of the patients have used analgesia in labour before, while 34.9% have not used analgesia in labour before.

Table 7: Analgesia used in labour

<table>
<thead>
<tr>
<th>Analgesia used in labour</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intramuscular opioid injection</td>
<td>120</td>
<td>60.0</td>
</tr>
<tr>
<td>epidural injection</td>
<td>27</td>
<td>13.5</td>
</tr>
<tr>
<td>inhalational</td>
<td>24</td>
<td>12.0</td>
</tr>
<tr>
<td>others</td>
<td>29</td>
<td>14.5</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>100</td>
</tr>
</tbody>
</table>

From table 7 intramuscular opioid injection 120 (60.0%) was the most commonly used analgesia in labour.

Table 8: Association between knowledge of analgesia use in labour and sociodemographic profile of the antenatal women (n= 307).

<table>
<thead>
<tr>
<th>Variables</th>
<th>% within the group (knowledgeable) about analgesia in labour</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-22</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>23-27</td>
<td>14.8</td>
<td></td>
</tr>
<tr>
<td>28-32</td>
<td>13.7</td>
<td>0.225</td>
</tr>
<tr>
<td>33-37</td>
<td>24.1</td>
<td></td>
</tr>
<tr>
<td>38-42</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>2.3</td>
<td>0.000*</td>
</tr>
<tr>
<td>Secondary</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>Post-secondary</td>
<td>25.8</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>15.4</td>
<td></td>
</tr>
<tr>
<td>Artisan</td>
<td>3.5</td>
<td>0.000*</td>
</tr>
<tr>
<td>Trader</td>
<td>5.4</td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>Health personnel</td>
<td>95.8</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>22.6</td>
<td>0.004*</td>
</tr>
<tr>
<td>1</td>
<td>21.6</td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td>7.7</td>
<td></td>
</tr>
<tr>
<td>5+</td>
<td>6.2</td>
<td></td>
</tr>
</tbody>
</table>

*Statistically significant (p < 0.05)

Bivariate analysis between the knowledge of respondents about the use of analgesia in labour and their biodemographic profile revealed a statistically significant association with level of education (p = 0.000), occupation (p = 0.000) and parity (p = 0.004). Further analysis using logistic regression to adjust for confounders showed that only occupation was significantly associated with the patients’ knowledge of analgesia in labour.
Table 9: Logistic regression model for predictors of knowledge of analgesia use during labour

<table>
<thead>
<tr>
<th>Variables</th>
<th>OR</th>
<th>P-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>-Ref</td>
<td>0.000</td>
<td>-Ref</td>
</tr>
<tr>
<td>Student</td>
<td>0.001</td>
<td>0.000</td>
<td>0.000-0.022</td>
</tr>
<tr>
<td>Artisan</td>
<td>0.008</td>
<td>0.000</td>
<td>0.001-0.091</td>
</tr>
<tr>
<td>Trader</td>
<td>0.002</td>
<td>0.000</td>
<td>0.000-0.044</td>
</tr>
<tr>
<td>Professional</td>
<td>0.004</td>
<td>0.000</td>
<td>0.000-0.052</td>
</tr>
<tr>
<td>Health personnel</td>
<td>0.005</td>
<td>0.000</td>
<td>0.000-0.051</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>Ref</td>
<td>0.000</td>
<td>Ref</td>
</tr>
<tr>
<td>Primary</td>
<td>0.000</td>
<td>1.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Secondary</td>
<td>0.280</td>
<td>0.309</td>
<td>0.024-3.244</td>
</tr>
<tr>
<td>Post-secondary</td>
<td>0.602</td>
<td>0.492</td>
<td>0.141-2.566</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Ref</td>
<td>0.000</td>
<td>Ref</td>
</tr>
<tr>
<td>1</td>
<td>1.057</td>
<td>0.956</td>
<td>0.146-7.643</td>
</tr>
<tr>
<td>2-4</td>
<td>1.244</td>
<td>0.828</td>
<td>0.173-8.940</td>
</tr>
<tr>
<td>5+</td>
<td>0.366</td>
<td>0.298</td>
<td>0.055-2.434</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-22</td>
<td>Ref</td>
<td>0.000</td>
<td>Ref</td>
</tr>
<tr>
<td>23-27</td>
<td>1.719</td>
<td>0.777</td>
<td>0.041-72.633</td>
</tr>
<tr>
<td>28-32</td>
<td>2.158</td>
<td>0.629</td>
<td>0.095-48.894</td>
</tr>
<tr>
<td>33-37</td>
<td>3.620</td>
<td>0.403</td>
<td>0.178-73.665</td>
</tr>
<tr>
<td>38-42</td>
<td>8.045</td>
<td>0.175</td>
<td>0.394-164.29</td>
</tr>
</tbody>
</table>

Table 10: Desirability of use of analgesia in labour

<table>
<thead>
<tr>
<th>Variables</th>
<th>% within the group</th>
<th>P-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-22</td>
<td>73.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23-27</td>
<td>84.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28-32</td>
<td>79.4</td>
<td>0.614</td>
<td></td>
</tr>
<tr>
<td>33-37</td>
<td>75.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38-42</td>
<td>77.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>61.4</td>
<td>0.004*</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>74.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-secondary</td>
<td>87.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>79.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>89.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artisan</td>
<td>70.2</td>
<td>0.016*</td>
<td></td>
</tr>
<tr>
<td>Trader</td>
<td>71.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>88.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health personnel</td>
<td>95.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>77.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>93.2</td>
<td>0.025*</td>
<td></td>
</tr>
<tr>
<td>2-4</td>
<td>74.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5+</td>
<td>71.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Statistically significant (p<0.0)

In Table 11, bivariate analysis between the desire of the patients for use of analgesia in labour and their biodemographic profile revealed a statistically significant association with educational status (p= 0.004), occupation (p= 0.016) and parity (p= 0.025). On further analysis with the logistic regression model, only parity, had a significant association with desire for analgesia use in labour (p = 0.048 for the nullipara) (Table 15).

**Discussion**

The advances recorded in the field of medicine from the time of Hippocrates and even earlier, have been largely dependent on the acquisition of knowledge. James Young Simpson in 1847 stated that “the distress and pain women often endure while they are struggling through a difficult labour are beyond description, and seem to be more than human nature would be able to
bear under any other circumstances". In the developed world, most of today’s laboring women do not want to suffer severe pain, and more importantly, they know that it is no longer necessary to do so. The situation is however different in the developing world were the greater percentage of women in labour are unaware of the possibility of labour being pain-free.

This study was conducted in a sub-urban environment it revealed that only 15% of the study population was aware of analgesia use in labour. This was markedly lower than the 80% awareness level reported in developing countries. Olayemi et al. found that only 27.1% of 1 000 respondents were aware of the availability of labour pain relief. Imarengiaye et al. in a study of women in labour conducted at the University of Benin Teaching Hospital Benin, found out that (37.5%) patients were aware that the pain of labour can be relieved but only 26.0% had prenatal information on labour analgesia. A more recent study conducted at the University College Hospital by A. Oladokun et al. showed an increase in the level of knowledge from a previous study carried out in the same institution from 27.1% to 38.3%. The level of knowledge obtained in this study is still much lower than that observed in earlier studies carried out in the country. This is likely due to sub-urban environment in which this study was conducted. 30% of the respondents in this study were traders and although 50.5% of the respondents had post-secondary level of education, the only variable which had a statistical significance on knowledge after further analysis by the logistic regression model was occupation, health professional having a greater level of knowledge of obstetric analgesia than other professions.

Fifty-eight point eight of the respondents acquired knowledge of analgesia use in labour from books, lectures and symposia. 30.4% of the respondents attributed their knowledge of analgesia in labour to interactions with health care personnel in the antenatal clinics and other quarters. This implied that the antenatal clinic counseling sessions are not being utilized properly as an avenue to adequately educate the patients on the issues relevant to the pregnant women. The media was identified as the source of knowledge on obstetric analgesia in only 4.3% of knowledgeable respondents. Considering the far-reaching influence of the media, this avenue should be adequately utilized in the dispersion of information on health topics, including obstetric analgesia.

Interestingly, 79.5% of the respondents in this study were desirous of analgesia use in labour. This high demand for analgesia use in labour was similar to that reported by Imarengiaye et al in their study where 85.1% of their patients would want their pain of labour relieved. A. Oladokun et al in their study reported that 47.5% of the respondents desired analgesia in labour. Olayemi et al reported acceptance of methods of analgesia as 57.6%. In this study, education (p = 0.004), occupation (p = 0.016) and parity (p = 0.025) had statistically significant association with the desire for analgesia use in labour. However, on further analysis with the logistic regression model, only parity, had a significant association with desire for analgesia use in labour (p = 0.048 for the nullipara). This was a different finding from that obtained in the study carried out by A. Oladokun et al where it was reasoned that the relatively low desire for analgesia use in labour may have been as a result of a fairly large population of respondents in his study who were nulliparous and may not have appreciated the severity of labour pain and the accompanying relieve from analgesia use.

The most preferred method of analgesia in labour in this study was the intramuscular injection of opioid (45.9%). This was similar to that obtained by A. Oladokun et al, 45.0%. In a similar study carried out by Mugambe et al in an antenatal clinic in South Africa, 31.1% of the respondents preferred some form of injection. This preference may be as a result of its popular use in many health care facilities / maternity homes in Nigeria.

Amongst the respondents who had a fore knowledge of analgesia in labour in this study, epidural analgesia was the preferred method (41.3%). This obviously supported the fact that knowledge of analgesia use in labour aids one in choosing a method that would be effective. This gap in knowledge must be addressed in order to reverse the trend observed in our society where women opt for a less effective method of analgesia unlike what is obtained in the developed world where the practice of epidural analgesia in labour was the closest to the ideal analgesic technique.
analgesia was the least desired (5.7%) in the study population. This was not surprising as this method of analgesia in labour is not a common one in our environment because of its high cost, non-availability and lack of expertise. In a study conducted in the University College Hospital, Ibadan, Nigeria, only 10% of the population was aware of inhalational analgesia.28

Sixty-two women in this study, 20.2%, rejected analgesia use in labour because they considered the pain experienced during labour as integral to the woman’s role in life. 35.5% of the respondents who did not desire analgesia in labour attributed this to the fact that they considered labour pain to be the will of God. 14.5% of the women were afraid of possible side-effects to the baby and themselves. The first two reasons reflect the mind set of many antenatal attendees in the country and that of their relatives. As much as we appreciate the cultural and religious pillars of our society we must sensitively seek avenues to address beliefs and practices that impair proper care of patients and in this case, the woman in labour.

Conclusion

This study revealed that most women are desirous of a pain-free labour. Efforts should be intensified and more avenues utilized to ensure that the populace is made more aware of the practice of obstetric analgesia. Facilities should be available to ensure that the demand for obstetric analgesia is met. It is therefore recommended that pregnant women be enlightened about analgesia in labour and the various methods available, and analgesia be readily and promptly offered to all women in labour making the experience a pleasant and memorable one.

References

1. Genesis Chapter 3 verse 16; The Holy Bible, King James Version
28. Olayemi O; Aimakhu C. O Attitude of patients to obstetric analgesia at the University College Hospital, Ibadan. Tropical J Med Sci 1985; 3(5): 46
35. Olayemi O; Aimakhu C. O Attitude of patients to obstetric analgesia at the University College Hospital, Ibadan. Tropical J Med Sci 1985; 3(5): 46
34. Mugambe J., Nel M., Hiemstra LA., Steinberg W.J., Knowledge of and attitude towards pain relief during labour of women attending the antenatal clinic of Cecilia Makiwane Hospital, South Africa SA Fam Pract 2007:49(4)
Prevalence of Multidrug Resistant Bacteria on Selected Hospital Surfaces in Paediatric wards of a Nigerian Hospital

Akanbi II AA¹, Saka KH¹, Obasia TO², Nyamngee A¹, Raheem RA, Oshodi, A¹, Olubiyi SK³

¹Department of Medical Microbiology and Parasitology, College of Basic Medical Sciences, University of Ilorin, Ilorin.
²Department of Paediatric and Child Health, University of Ilorin Teaching Hospital, Ilorin.
³Department of Nursing, Faculty of Clinical Sciences, College of Health Sciences, University of Ilorin.

Abstract

The hospital surfaces are frequently contaminated with important health care associated pathogens. These surfaces represent a secondary reservoir for microorganisms. The study was conducted in 2013 to determine the prevalence of multidrug resistant isolates on selected hospital surfaces in paediatrics ward of UITH, Ilorin. Samples were collected using ethylene oxide sterilized swab stick pre-moistened with sterile normal saline from selected non-critical surfaces and were aseptically cultured on media and incubated aerobically at 35-37°C for 18-24 hours. Identification of bacterial isolates was carried out using standard microbiological procedure. Isolates identified as Staphylococcus aureus were screened for MRSA using cefoxitin disk diffusion method, and the Gram negative isolates such as Klebsiella species and E.coli were screened for ESBL production using the double disk synergy test. A prevalence of 19.05% was recorded for MRSA production in this study with the highest occurrence found at the emergency paediatric units of the hospital. The prevalence of extended spectrum Beta lactamase production (ESBL) K. pneumoniae and E. coli was found to be 18.9%. It was only K. pneumoniae that was positive for ESBL production. The isolation of MRSA from surfaces within paediatric wards is of great importance because of the immaturity of the immune system of paediatric population which may result in prolong hospital stay, increased cost of treatment and treatment failure may occur due to acquisition of multidrug resistant bacteria. Influx of patient’s relation within the hospital wards should be reduced, however patients with multidrug resistant bacterial infection should be isolated and healthcare givers should observe the five moment of hand washing recommended by WHO.

Key words: Hospital Surfaces, Multidrug Resistance Bacteria, Paediatric wards

Introduction

Healthcare settings represent an environment where both infected persons and those at increased risk of infection congregate. However, patients with infections or carriers of pathogenic microorganisms admitted to hospital are potential sources of infection for other patients and staff. Patients who become infected in the hospital are a further source of infection.¹,²

It is quite difficult to directly link non-critical hospital surfaces and medical equipments to infection transmission.³ Transmission can occur either directly or indirectly when healthcare worker’s hands or gloves become contaminated by touching contaminated surfaces or after touching patients, or when patients comes in direct contact with a contaminated surface. Pathogens that have been linked to transmission via contaminated environmental surfaces and medical equipments include MRSA, VRE, Clostridium difficile, Acinetobacter species and Norovirus. Except for Norovirus, these organisms pose clinically important antimicrobial resistance problems and are among the most common causes of healthcare associated infections in hospitals.⁴

Neely and Maley⁵ highlighted that 42% of 12 nurses who had no direct contact with patients, contaminated their gloves by touching objects in the room of patients.
with MRSA in wounds or urine. Weber et al. emphasized that admitting a new patient to a room previously occupied by a MRSA or VRE-positive patient significantly increases the odds of acquisition for MRSA or VRE. In a study by Otter et al, they reported cultures of ten standardized highly touched surfaces, and found that 59% of these surfaces were contaminated in the rooms of some patients with heavy gastrointestinal colonization by MRSA.

Antimicrobial resistant pathogens that causes healthcare associated infections pose an on-going and increasing challenge to hospitals, both in the clinical treatment of patients and in the prevention of the cross-transmission of these problematic pathogens. These pathogens include methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus species*, extended-spectrum β-lactamase producing *Escherichia coli*, *Klebsiella* species, and fluoroquinolone or carbapenem-resistant Enterobacteriaceae or *Pseudomonasaeruginosa*. The role of fomites and the inanimate hospital environment in the transmission of infection has been debated for many years. However, there is increasing evidences that contaminated surfaces, especially those frequently touched by hands can contribute to the spread of health care associated pathogens. The aim of this study is to determine the prevalence of multidrug resistant organism on selected hospital surfaces in the paediatric wards of the University of Ilorin Teaching Hospital Ilorin.

**Methodology**

This study was conducted at the University of Ilorin Teaching Hospital, a tertiary health centre and the only referral centre in Kwara state. It is in the North Central region of Nigeria, the hospital has over 450 beds capacity with various subspecialties. The paediatrics ward has over 115 beds capacity.

The study was a cross-sectional study of indoor hospital surfaces within the five (5) paediatric wards namely (neonatal intensive care units, paediatric medical ward, paediatric surgical ward, emergency paediatric unit I and II.). The study populations were bed rails, bed lockers, radiant warmers, incubators, trolleys, medical tables, door handles and wash sinks.

All the study population that falls within the five (5) paediatric wards were included in the study and outdoor surfaces and other indoor surfaces not within the population was excluded from this study. Total population survey was employed, and a total of 201 samples were collected from the various surfaces within the five (5) wards. Ethical clearance was obtained from the ethics and research committee of UITH before the commencement of the study.

Samples were collected using ethylene oxide sterilized swab stick pre-moistened with sterile normal saline from the selected surfaces (bed rails, bed locker, radiant warmers, incubators, trolleys, door handles, medical tables and wash sinks) which were inserted in bijou bottle containing 5ml of sterile Stuart’s transport medium and was then transported to Microbiology lab of University of Ilorin Teaching Hospital within 30minutes of sample collection.

Laboratory analysis of samples was carried out within 2 hours of sample collection. The media were prepared aseptically according to the manufacturer’s instructions. The samples were cultured on sheep blood and MacConkey agar to enhance growth and proper identification of the organisms, which was then incubated aerobically at 35-37ºC for 18-24hours. After aerobic incubation, visible colonies on plates were examined visually for macroscopic characteristics of aerobic bacteria: colony size, shape, colour, consistency, odour, elevation and hemolysis. Gram staining (microscopy) was carried out to determine the morphology of the bacteria, followed by a battery of biochemical reaction specific for *Staphylococcus aureus*, *Klebsiella* and *E. coli*. The isolates were screened for MRSA production using cefoxitin disk diffusion method and ESBL production using DDST method.

**Discussion**

Contamination of surfaces within the hospital can increase the prevalence of health care associated infections, especially at both extreme of live due to lowered immunity; because numerous organism abounds the hospital environment. A total of 201 swab samples were collected from various hospital surfaces from the five different paediatric wards of the hospital. Of the 201 swab samples collected from various
surfaces such as the bed rails, lockers, incubators, radiant warmers, medical tables, door handles and the wash sinks. 141 (70.1%) were positive for bacteria growth as shown in Table 1. This finding agrees with the result of a similar study in Maiduoguri by Okon et al11 who sampled 267 surfaces and 70.0% were positive for bacteria growth with varying number of bacterial isolates per sampled surfaces.

The bacterial isolates in this study were retrieved from surfaces made of different materials. It was suggested by Schmidt. et al that copper surfaces are usually less contaminated within the wards, though there was no copper among surfaces sampled in this study. All aerobic bacteria were retrieved from aluminium surfaces, and this includes the bed rails and the lockers which had the highest number of organism 86.0 and 69.9% respectively. These two surfaces are surface that comes in frequent contact with the patient, relatives and health care workers. One these surfaces majority of the isolates present on them were both MSSA,MRSA and the ESBL producer K. pneumoniae. This report agrees with the result of Bhalla et al3 who demonstrated that MRSA frequently recovered from bed rails and the bed side lockers. Though it is often difficult to directly link non-critical hospital surfaces and medical Equipments to infection transmission according to Bhalla et al3. Transmission can occur directly when health workers hand or gloves become contaminated by touching contaminated surfaces. Pathogens that have been linked to transmission via contaminated surfaces and medical equipment include MRSA. ESBL producers rarely contaminate surfaces except in areas where there is faecal contamination. K. pneumoniae often contaminate surfaces in the ward than E. coli.

The prevalence of methicillin resistant Staph aureus(MRSA) obtained was 19.0% while that of methicillin susceptible Staph aureus(MSSA) was 81.0%, and the prevalence of extended spectrum beta lactamase producers was18.9%; and it was only K. pneumoniae that was positive for ESBL production. Staph aureus used to be the most recognised pathogen with health care associated infections, and the primary reservoirs for MRSA in the hospital are the colonized or infected individual who readily contaminate medical equipment and the environment within their vicinity. MRSA can survive on dry environmental surfaces for months as reported by Kramer et al 4.

In this study, there varied contamination of the surfaces in the various wards. The MSSA were majorly found in both the NICU and PMW with 35.2% and 27.5% respectively, while MRSA were more in the two Emergency of the Paediatric unit. The ESBL producer K. pneumoniae was more in the Emergency unit and the Paediatric medical ward. The wide spread use of antibiotics for both therapy or prophylaxis in the wards could be responsible for the increased number of these isolates in the wards. The more an antimicrobial agent becomes widely used, bacteria resistance to this drug emerge and may spread in the health care setting. This problem is particularly critical in developing countries where more expensive second line antibiotics may not be available or affordable, according to Duce et al 12, 13. The high contamination of the Emergency unit may be due to the fact that this ward is usually the place of first contact where patients are usually admitted first before transfer to other wards for follow up. The least contaminated ward is the neonatal intensive care unit. This is not surprising as movements into this unit are always restricted, relatives are rarely allowed in and the movement of the health care workers and that of the mothers are coordinated.

The findings of this study revealed that there are pathogenic aerobic contaminants on noncritical hospital surfaces within the Paediatric ward of the University of Ilorin Teaching Hospital. The leading aerobic bacteria contaminant from this study are the MRSA, and the ESBL in a smaller proportion. The isolation of this multidrug resistant isolates from these surfaces is an indicator of potential threat of this microorganism in areas where found, and this require an urgent surveillance. Though cleaning and disinfection of non-critical hospital surfaces should be encouraged at least every 2 hours and regular hand washing on the part of the health care workers before and after every procedure.

References

2. Weber, DJ and Rutala, WA. Understanding and Preventing Transmission of Healthcare- Associated Pathogens Due to the


Prevalence of toxigenic fungi in some staple foodstuffs in Plateau and Taraba States, Nigeria.

Mokogwu ATH¹, Onohwakpor EA², Mokogwu EE³

¹Department of Chemical Pathology, Faculty of Clinical Medicine, Delta State University, Abraka, Nigeria
²Department of Obs-Gyn, Faculty of Clinical Medicine, Delta State University, Abraka, Nigeria
³Department of Agricultural Extension and Management, FCAHPT, NVRI, Vom, Nigeria

Abstract

Aim: Fungal diseases are common places in animal and man. This study was done to determine the presence of toxigenic fungi in four common foodstuffs on retail outlets in Plateau and Taraba States of Nigeria.

Methods: The staple foodstuffs (local variety) consisting of maize (Zee mays), sorghum (Sorghum bicolor), millet (Pennisetum typhoides) and soya beans (Glycine max) were obtained from selected six Local Government Areas of the two States. Sampling was done twice; in dry and rainy seasons. Fungal isolation and identification were done by standard techniques.

Results: In rainy season there was significant difference (p < 0.001) in the prevalence of Trichoderma spp. compared to other fungi isolates in Plateau State while there was significant difference (p < 0.001) in the prevalence of A flavus compared to other fungi isolates in Taraba State. Also in dry season there was significant difference (p < 0.001) in the prevalence of A flavus compared to the rest fungi isolates in Plateau State. Equally there was significant difference (p < 0.001) in the dry season isolates of Phoma sorghina /A flavus/ Phoma compared to the rest fungi isolates in Taraba State. There was significant difference (p < 0.05) in the prevalence of fungi isolates in the four foodstuffs in Plateau and Benue States in both rainy and dry seasons. However, in rainy season there was significant difference (p < 0.05) in fungal isolates in maize compared to other foodstuffs in Plateau State. Comparison of rainy and dry season fungi isolates showed no significant difference (p > 0.05) amongst the four foodstuffs in both Plateau and Taraba States.

Conclusion: The prevalence of these toxigenic fungi: Aspergillus flavus, Fusarium moniliforme, Fusarium spp., Phoma spp., Penicillium spp. and Penicillium fumiculosum amongst other common fungal contaminants in maize, sorghum, millet and soya beans portends great danger when such unwholesome grains are consumed by humans.

Key Words: Toxigenic fungi, maize, sorghum, millet, soya-beans, Plateau and Taraba States.

Introduction

Fungal diseases are common places in animal and man.¹ In such disease, the fungi are actively growing on and invading the body of their hosts. However, Christensen¹ in 1975 stated that when fungi grow on a living organism or on stored foodstuffs, they may produce harmful metabolites that diffuse into the food. It is believed that production of these metabolites was a means of protecting their food supply from being eaten by other organisms.¹,²,³,⁴ These metabolites are referred to as mycotoxins, which literally mean "fungus poison".Christensen¹,²,³,⁴ believed that the fungi that produce mycotoxins do not have to be present to do harm, as the environment may have become unsuitable for them. Though the fungus is no longer alive, while it was growing,²,³ it if produced a mycotoxin it would have poisoned the grains or foodstuff.⁴ Mycologists believed these are produced as protection against competing organisms and therefore, humans are caught in the cross-fire of this fight for survival. ⁵Diseases in animals and human resulting from the consumption of mycotoxins are called mycotoxicoses. Jacobson BJ et al⁹ in 2004 stated that the effects in domestic animals include allergic reactions, reproductive failure, unthriftness, loss of appetite, feed refusal, suppression of the immune system, decreased feed efficacy and mortality. When produced on human foods or animal feedstuffs, mycotoxins constitute a potential toxic hazard which cause disease and reduced production.²,³,⁷,⁸,⁹,¹⁰,¹¹,¹²,¹³,¹⁴ Each mycotoxin is produced by one or more very specific fungal species. In some cases one
species can form more than one mycotoxin for example the aflatoxins can be formed by *Aspergillus flavus*, *Aspergillus parasiticus* and limited other *Aspergillus* while Ochratoxin A is considered to be the main product of *Aspergillus ochraceus* in tropical regions and *Penicillium verrucosum* in temperate areas\(^\text{15}\). Fungi that produce mycotoxins are referred to as toxigenic fungi\(^\text{16}\). Adams RL\(^\text{16}\) in 2001 observed that the most frequently studied mycotoxins are produced by species of *Aspergillus*, Fusarium, *Penicillium*, Stachybotry and *Mycothecium* and these toxins have been detected from many other fungi under certain growth conditions. Adams RL\(^\text{16}\) further stated that the kinds and amounts of toxin produced depend on the fungal strain, the growing conditions, as well as the presence or absence of other organisms. WHO\(^\text{17}\) in 2002 stated that any crop or foodstuff that is stored for more than a few days is a target for mould growth and mycotoxin formation. EMAN\(^\text{15}\) in 2004, documented that the major commodities affected are cereals, nuts, dried fruits, coffee, cocoa, spices, oil seeds, dried peas and beans and particularly apples. Gbodi TA et al\(^\text{18}\) in 1986a isolated *Fusarium spp* and *Neurospora spp* and noted high levels of aflatoxin in maize in Plateau State of Nigeria. However, works are still scanty to ascertain the ever increasing economic importance of toxigenic fungi in Nigeria. Therefore, this work was done to determine the prevalence of toxigenic fungi in maize, sorghum, millet and soya-beans on retail outlets in parts of Plateau and Taraba States of Nigeria.

**Materials and Method**

Except where otherwise stated, all chemicals and solvent used in this work were of analytical grade as supplied by BDH Chemicals Ltd, Poole, England.

**Media/Reagents**

**Sterile Normal Saline:** Nine grammes (9g) of NaCl were dissolved in a litre of distilled water and autoclaved at 121°C for 15 minutes. This was allowed to cool on the bench and properly labeled. **Sabouraud’s dextrose agar (SDA):** Sixty five grammes (65g) of SDA were suspended in a litre of distilled water and brought to boil to dissolve completely. This was then sterilized by autoclaving at 121°C for 15 minutes and 0.5g of chloramphenicol was aseptically added to the litre of the autoclaved cooled medium. About 20cm\(^3\) were dispensed into Petri dishes. Also 5cm\(^3\) amount was dispensed into long test tubes plugged with cotton wool as slants. **Semi-synthetic medium:** Forty grammes (40g) of SDA were suspended in a litre of distilled water and prepared as stated above.

**Area of Study**

Plateau and Taraba States, out of which six local government areas were selected. Plateau: Jos East/North, Jos South, Lantang North/South, Pankshin, Qu’a’an Pan and Shendam. Taraba: Donga, Gossol, Ibi, Kurmi, Takum Lisaam and Wukari.

**Sample Foodstuffs**

Staple foodstuffs (local varieties) consisting of maize (*Zea mays*), sorghum (*Sorghum bicolor*), millets (*Pennisetum typhoides*) and soya beans (*Glycine max*) were obtained from the selected six local government areas’ retailed outlets in each of the States. About 2kg of each foodstuff were purchased from the selected six local government market outlets. Samples were done twice: Dry season, between the Months of September and February and at rainy season between March and August, from 1997 to 2005. All foodstuffs sampled were labeled, placed separately in a paper bag and kept under cool, dry conditions in order to prevent fungal growth or possible production of mycotoxin(s) (Jacobsen BJ et al\(^\text{19}\)).

**Fungi Isolation.**

Method of Gabal MA et al\(^\text{19}\) was adopted. About 10g of visibly mouldy grains or ground/ pulverized yam samples were placed in 250cm\(^3\) conical glass flasks with screw caps each containing 100cm\(^3\) sterile normal saline solution. The cap was screwed tight and later allowed to stand on the bench for 2mins. 1.0cm\(^3\) of the supernatant was further diluted 1:10 in clean sterile long glass test-tubes in sterile saline. The tubes were similarly shaken. Then 0.5cm\(^3\) each of the diluents were aseptically inoculated onto the surface of freshly prepared SDA plates containing 0.5g chloramphenicol/l to suppress the growth of any contaminating bacteria. The inoculum was evenly spread on the agar surface in a Petri dish with sterile loop. Plates were then incubated at 20°C incubator for 2-3 weeks.

**Identification of Fungi**

Fungi growth on plates were identified based on gross morphology and microscopy (20, 21, 22, 23,) at the Federal College of Veterinary and Medical Laboratory Technology, National Veterinary Research Institute, Vom-Jos and at the Biotechnology Centre, Institute of Bioscience & Technology, Cranfield University, Silsoe Bedford, UK.
Statistical Analysis.  
Statistical analysis was computed using SPSS (Statistical Package for Social Science) and Microsoft Excel Statistical Tool-Pack.

Results

Table 1 shows the mean of fungi isolated from the four foodstuffs during rainy season in the two States, while table 2 represents that of dry season. In rainy season, there was significant difference (p<0.001) in the prevalence of fungi labeled “a” (Trichodema spp) and those labeled “b” (the rest fungi isolates) in Plateau State while there was also a significant difference (p < 0.01) in the fungi labeled “a” (Fusarium moniliforme/A. flavus and the rest fungi isolates in Taraba State (table 1).

Table 1: Mean of fungi isolates from the foodstuffs during rainy season in Plateau and Taraba states

<table>
<thead>
<tr>
<th>Fungi isolates in numbers</th>
<th>State</th>
<th>Plateau</th>
<th>Taraba</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plateau</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>19.50a</td>
<td>15.75a</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7.50</td>
<td>±2.78</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>7.50</td>
<td>±2.78</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>8.25</td>
<td>±3.11</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>14.25b</td>
<td>±4.46</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>11.25b</td>
<td>±3.85</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>9.75</td>
<td>±10.60</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>9.75</td>
<td>±8.45</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>12.00</td>
<td>±4.90</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>8.00</td>
<td>±3.10</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>6.00a</td>
<td>±19.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.00b</td>
<td>±5.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-Value</td>
<td>4.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P-Value</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

Prevalence expressed as x ± STD per State while each number represents the Fungal isolates from all four foodstuffs: Maize, Sorghum, Millets and Soya-beans. P – values are assessed horizontally.

Note: Similar superimposed letters indicate means that are not significantly different from each other.

Equally in dry season and in Plateau State, fungi labeled ‘a” was significantly different (p<0.001) from the group labeled “b”, with A. flavus as the highest followed by Fusarium spp and Fusarium moniliforme/Phoma spp. in that order (table 2).

Table 2: Mean of fungi isolates from the foodstuffs during dry season in Plateau and Taraba states

<table>
<thead>
<tr>
<th>Fungi isolates in numbers</th>
<th>State</th>
<th>Kaduna</th>
<th>Nasarawa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Plateau</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>19.50a</td>
<td>15.50a</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6.75</td>
<td>±2.12</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6.75</td>
<td>±2.12</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>6.75</td>
<td>±2.12</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>12.75b</td>
<td>±6.40</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>13.50b</td>
<td>±4.24</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>6.75</td>
<td>±2.12</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>6.75</td>
<td>±2.12</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>7.50</td>
<td>±2.78</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>12.75b</td>
<td>±6.76</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>9.00</td>
<td>±4.24</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>6.00</td>
<td>±0.00</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>9.00</td>
<td>±4.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F-Value</td>
<td>8.39</td>
</tr>
</tbody>
</table>

P-Value p < 0.001  p < 0.001

Prevalence expressed as x ± STD per State while each number represents the Fungal isolates from all four foodstuffs: Maize, Sorghum, Millet and Soya-beans. P – values are assessed horizontally.


**Note:** Similar superimposed letters indicate means that are not significantly different from each other. P < 0.001= Very high significant difference.

In Taraba State, there was significant difference (p<0.001) between the group of fungi labeled “a” and those labeled as “b” and those not labeled, with Phoma sorghina and A. flavus being the most frequent closely followed by Phoma spp, Fusarium moniliforme / Penicillium spp and Fusarium spp. in that order (table 2). In both Plateau and Taraba States, there was significant difference (p<0.05) in the mean of fungi isolates in the four foodstuffs (table 3), though there was less growth of mycoflora in soya-beans in the two States (Plateau- 1.75 ± 2.12; Taraba - 1.60 ± 1.90). However, there was an increased fungal isolates in maize in Plateau State compared to the other foodstuffs in both rainy and dry season (tables 3 & 4).

Table 3: Mean of fungi isolates from individual foodstuffs during rainy season in the two states

<table>
<thead>
<tr>
<th>Grains</th>
<th>Plateau</th>
<th>Taraba</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>15.33 ± 8.00</td>
<td>8.33 ± 7.00</td>
</tr>
<tr>
<td>Sorghum</td>
<td>7.50 ± 1.75</td>
<td>8.12 ± 1.60</td>
</tr>
<tr>
<td>Millet</td>
<td>2.68 ± 2.12</td>
<td>3.64 ± 1.90</td>
</tr>
<tr>
<td>Soya</td>
<td>2.12 ± 3.11</td>
<td>2.30 ± 3.20</td>
</tr>
<tr>
<td>Beans</td>
<td>0.95 ± 5.43</td>
<td>0.90 ± 3.16</td>
</tr>
</tbody>
</table>

**Note:** Prevalence expressed as x ± STD per foodstuff in Plateau and Taraba States.

P – values are assessed horizontally.

Similar letters indicate means that are not significantly different.

P > 0.005 = Not significantly different.

Also there was significant difference (p<0.05) amongst the fungi isolates in the four foodstuffs in both rainy and dry seasons with the increase in growth of fungi isolates in maize being more noticeable in the two States. Rainy and dry seasons comparison of the mean fungi isolates from the four foodstuff samples shows that there was no significant difference (p>0.05) in fungi isolates in the two States (table 5).

Table 4: Mean of fungi isolates from individual foodstuffs during dry season in the two states

<table>
<thead>
<tr>
<th>States</th>
<th>Maize</th>
<th>Sorghum</th>
<th>Millet</th>
<th>Soya</th>
<th>Beans</th>
<th>F-value</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plateau</td>
<td>12.86 ± 8.14</td>
<td>10.36 ± 0.95</td>
<td>5.43 ± 3.11</td>
<td>4.86 ± 0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taraba</td>
<td>10.71 ± 9.43</td>
<td>8.50 ± 0.40</td>
<td>4.01 ± 3.10</td>
<td>3.65 ± 0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Prevalence expressed as x ± STD per foodstuff in Plateau and Taraba States.

P – values are assessed horizontally.

Similar letters indicate means that are not significantly different.

P < 0.005 = Significantly different.

P > 0.005 = Not significantly different.

During the rainy season in Plateau State, *Trichoderma spp* was the highest fungi isolate followed by *A. Flavus, Fusarium monilferme, Penicillium fumiculosum, Fusarium spp, Helminthosporum spp.*, *Neurospora spp, Cephalosporium spp.*, *A. niger /A. fumigatus, in that order* (table 1). While in dry season (table 2), *A. flavus* has the highest frequency followed by *Fusarium spp.* and *Phoma spp.* in that order. In Taraba
State. *Fusarium moniliforme* was the highest fungal isolate in wet season followed by *A. flavus, Fusarium spp.*, *Trichoderma spp.*, *Penicillium funiculosum / Rhizopus spp.* and *Chaetomium globosum* in that order (table 1). During dry season, *Phoma sorgihina* was the highest fungal isolate, followed by *A. flavus, Phoma spp.*, *Fusarium moniliforme/Penicillium spp.*, *Fusarium spp.* and *Rhizopus spp.* in that order (table 2). In Plateau State the foodstuff that is most highly vulnerable to fungal infestation, both during the rainy season and dry season was maize followed by millet, sorghum and soya-bean. While in Taraba State, maize was also the most vulnerable foodstuff that is sensitive to fungal growth closely followed by sorghum, millet and soya bean (tables 3 & 4).

**Discussion**

Storage fungi may be pathogenic or saprophytic. Our findings of high prevalence of *Fusarium moniliforme, A. flavus, and Fusarium spp.* in rainy and dry seasons in Plateau and Taraba States are in agreement with the report of Gbodi *et al.*, who in 1986a and 1986b, noted a very high growth of mycoflora in field and stored grains of maize and acha in Plateau State. Our findings also correlates with the work of Da-Silva *et al.* who in 2000 in Brazil, observed high incidence of *A. flavus, Fusarium moniliforme* and *Fusarium spp.* in some agricultural grains. Equally our findings of high *A. flavus* is in line with the work of Gabal *et al.* who in 1994 isolated a total of 103 *A. flavus* out of 150 agricultural commodities and animal feeds in Egypt. Blaney and Williams in 1991, in Australia observed that high summer temperatures, irregular rainfalls and insect damage are probably important factors in allowing *Aspergillus flavus* and *A. parasiticus* to invade summer crops in the field. Hell *et al.* in 2000b equally noted that insect is important in the spread of *A. flavus* in pre-harvest maize. From our findings, the same may be true particularly with a climate that varies from equatorial in the South, tropical in the Central region to arid in the far North of Nigeria. There is also variation in climatic conditions particularly in Plateau State which has the highest prevalence of *Aspergillus flavus* in both rainy and dry seasons, and exceedingly high growth of *Trichoderma spp.* in rainy season. Equally our findings of high prevalence of *Fusarium moniliforme* and *Fusarium spp.* are also in agreement with the assertion of Salifu in 1981 and Agboola in 1984 that *Fusarium spp.* are among the food spoilage moulds that commonly infect grains in Nigeria. Our findings that maize is perhaps more vulnerable to fungi growth is in line with the observation of Turner *et al.*, who in 2000 stated that maize is frequently infected with *Aspergillus spp.* in West African and also in tune with the work of Mashinini and Dutton who in 2006 isolated *Fusarium spp.* in wheat and wheat based products in South Africa. From our findings, *A. fumigates, A. niger* were isolated from foodstuffs only in rainy season while *A. parasiticus*, *Penicillium spp.*, *Phoma sorgihina* and *Phoma spp.* were also isolated in dry season. This observation seems to suggest that there may be seasonal variations in the growth of some fungi.

**Conclusion:** The presence of these toxigenic fungi in maize, sorghum, millet and soya bean which are common staple foodstuffs portends great danger to humans particularly when such unwholesome foodstuffs or grains are consumed.

**References**

Acute Suppurative Parotitis in Infancy: A Case Report in a Nigerian Tertiary Hospital

Odike AI, Akhigbe IE, Ekuma CN.
Department of Paediatrics. Irrua Specialist Teaching Hospital.

Abstract
Acute suppurative parotitis (ASP) is a rare entity in early infancy. The clinical presentation may be non-specific. We present the case of a 90-day-old breastfed male infant with massive purulent drainage from the Stensen duct into the oral cavity. Ultrasonography of the right parotid gland revealed an enlarged parotid gland with heterogeneous echogenicity compatible with Acute Suppurative Parotitis (ASP), without any sialolithiasis. Culture of the exudate yielded growth of Staphylococcus aureus. Based on the clinical presentations and ultrasound findings, a diagnosis of right ASP was made. The patient responded well to a 14-day antibiotic therapy and supportive measures. ASP should be considered as a differential diagnosis of a neonatal parotid swelling with purulent drainage from the Stensen duct into the mouth, since early and prompt diagnosis prevents morbidity and complications.

Keywords: Parotitis, Infant, Infection

Introduction
Acute non-obstructive suppurative parotitis in the past was almost confined to debilitated, post operative, dehydrated and immunosuppressed elderly patients.

The most common form of parotid swelling in children and young adults is mumps. Without the history of epidemics and exposure, the diagnosis of mumps may be difficult.

Another form of acute parotid swelling which occurs in children is recurrent Sialadenitis, which can occur at any age. Pus can be expressed from the duct and pneumococci have been reported as the predominant causative organism on culture. There is usually no pain, the swelling is limited to the gland and lasts 14-20 days before subsiding spontaneously, and is often recurrent.

The third type of parotid swelling is acute suppurative parotitis; it is the least common and usually due to Staphylococcus aureus bacteriophage 80-81. The gland is swollen, red, tender, and painful. Suppurative parotitis may be confused with Recurrent parotitis. While suppurative parotitis responds to appropriate antibiotics based on culture of the pus obtained from Stensen’s duct or surgical drainage, recurrent parotitis subsides spontaneously.

Acute suppurative parotitis (ASP) is rarely encountered in the neonatal age group and in early infancy. The peak incidence of this disease is between the ages of 2 and 14. Due to the rarity of acute suppurative parotitis, it is important to gain exact and extensive insight into the general and specific aspects of the pathological changes in the salivary glands of these age groups, for prompt diagnosis and to prevent complications, as ASP responds well to antibiotic therapy.

Case Report
A 90-day-old breastfed male infant presented with a 5-day history of cough and catarrh, 3-day history of fever and irritability, and a 1-day history of poor sucking and right facial swelling. He was delivered via caesarean section at 35 weeks of gestation on account of abruptio placentae with a birth weight of 2000g. He had poor Apgar scores and was managed for perinatal asphyxia but however had good recovery. His postnatal life was further complicated with the development of
progressive increase in head size with craniofacial disproportion in favour of the cranium, noticed about the 60th day of life while he was being followed up post discharge. Cranial CT scan revealed congenital hydrocephalus with aqueductal stenosis for which he was commenced on Acetazolamide by the neurosurgical team, as surgery was being awaited.

On the day of re-admission, his weight was 5800 g and axillary temperature was 37.8 degree centigrade. The parents reported no history of trauma to the infant's face or head, and the mother has no history suggestive of mastitis or recent skin infection. General examination revealed an irritable, non-toxic looking, febrile infant, with normal hydration and perfusion. The anterior fontanelle was bulging but normotensive measuring 8.0x8.0 centimeters and the occipito-frontal circumference was 45 centimeters (above the 97th percentile).

Examination of the head and neck revealed craniofacial disproportion with sun-setting eyes, a 6.0x6.0-centimeter firm, diffuse, tender swelling over the right parotid region. (Fig.1). The overlying skin was erythematous and warm. Pus exuded from the right inflamed right Stensen duct especially when pressure was applied to the gland.

Complete blood count revealed a haemoglobin level of 9.4 g/dl and total white blood cell count of 23,800 cells/mm3 (66.1% neutrophils, 28.9% lymphocytes).

The serum electrolytes and urea analysis were normal. Direct smear from Stensen duct showed gram positive Cocci and the culture yielded growth of Staphylococcus aureus, which was sensitive to vancomycin, meropenem, ceftriaxone, ciprofloxacin, and trimethoprim/sulfamethoxazole.

Ultrasoundography of the parotid glands revealed an enlarged right parotid gland with heterogeneous echogenicity compatible with ASP, without any sialolithiasis. Based on the clinical presentations and ultrasound findings, the patient was diagnosed with acute right ASP.

He was treated with a 14-day course of parenteral Ceftriaxone at 100mg/kg/day once daily. Amikacin at 15mg/kg/day given in two divided doses and Metronidazole at 7.5mg/kg/dose every 8hours. Using Hilton’s method, 1.5 mls of purulent exudates was also drained from the right parotid gland. After 2 days of parenteral antibiotic therapy, the fever resolved and by the 10th day of treatment the parotid swelling had gradually resolved.

Fig 1.: left: Enlargement of the right parotid region with erythema (arrows). Right: facial asymmetry from the enlarged right parotid gland region.

**Discussion**

The most common presentation of ASP is fever, swelling and erythema in the pre-auricular area. Purulent drainage from Stensen’s duct is pathognomonic of this condition, and culture of the exudate will both confirm the diagnosis and is of great help in the treatment. The diagnostic criteria of supplicative parotitis include: a combination of parotid swelling, purulent exudation from Stensen’s duct, and growth of pathogenic bacteria in the pus culture. Our patient met all these criteria. Although the diagnosis of ASP is primarily based on the patient’s clinical findings, examination with ultrasound as a non-invasive and useful option may help confirm the diagnosis (as was applied in our patient). It also helps to exclude other predisposing factors such as the anatomical abnormalities of Stensen’s duct, mechanical salivary duct obstruction secondary to sialolithiasis, and neoplasms.

Advanced imaging studies may be considered when the diagnosis is in doubt to rule out other congenital and inflammatory disorders of the parotid gland. Bacterial seeding of the parotid gland can occur haematogenously, but infection is more common from oral flora tracking in a retrograde fashion into the
gland\(^{10}\). Several risk factors for the development of ASP have been identified. These include: low birth weight, prematurity, oral trauma, immune suppression, and congenital variations in the ductal structure. Sepsis and malnutrition are also frequently observed in infants with parotitis. Dehydration is another risk factor as it causes salivary stasis leading to bacterial ascent from the oral cavity\(^{10,12}\). Breastfeeding or contaminated formula can transmit bacteria and potentially cause sialadenitis\(^{13}\). In this case, the infant was breastfed but his mother did not show any signs of mastitis as it is reported by Sekhon et al\(^{14}\). He was on Acetazolamide at 8mg/kg/dose 3 times daily (appropriate doses), an osmotic diuretic which can cause dehydration especially when feed volumes are not quantified. However, the history of dehydration could not be ascertained, and he was well hydrated at presentation.

Conclusion

Although ASP is rare, it should be strongly considered in cases of neonatal and infantile sepsis associated with facial swelling with or without any predisposing factors. Prompt diagnosis and treatment with the necessary antibiotics reduces morbidity and mortality in affected children.

References

Proximal femoral focal deficiency: Case Report

Akhigbe OT, Obi-Egbedi-Ejakpovi EB, Irabor PF.

Radiology Department Irrua Specialist Teaching Hospital, Irrua, Edo State.
Radiology Department, Ambrose Alli University Ekpoma.

Abstract

Proximal femoral focal deficiency is a rare congenital skeletal abnormality that involves the femur and acetabulum. It is thought to result from an early disturbance of growing mesenchyme. The condition results in leg length discrepancy due to a shortened and hypoplastic femur.

We report a case of a 4-day old male baby who presented with a history of shortened right lower limb from birth and in whom a plain x-ray of both lower limbs revealed a hypoplastic distal right femur. No other associated congenital anomaly was revealed.

There is a need for early radiologic classification of proximal femoral focal deficiency for surgical planning and treatment.

Keywords: Proximal femoral focal deficiency, congenital, skeletal

Introduction

Proximal femoral focal deficiency is an uncommon congenital skeletal defect in which there is a failure in development of the proximal femur and acetabulum of varying degrees.\(^1,2\) It has an estimated incidence of 0.11 to 0.2/10,000 births. The bilateral form is rare occurring in 10 to 15% of cases\(^3\). It may occur with or without fibula hemimelia, which is a congenital absence of the fibula.\(^2,4\)

The following is a case of proximal femoral focal deficiency in a 4-day old child, presented because of its classical radiographic features and rarity.

Case Report

Master A.D, a 4-day old male baby born to a 27-year-old house wife and a 34-year-old trader presented to the General Outpatient Clinic of University of Benin Teaching Hospital (UBTH) having been referred from a private hospital where they gave birth to the baby. The mother complained of the baby having a shortened right lower limb from the hip to the knee since she gave birth to the baby. Pregnancy and delivery were uneventful. The baby is the third child in a monogamous setting. The other siblings are alive and healthy. There is no history of congenital anomaly, sickle cell disease in the family or use of un-prescribed drugs during the pregnancy.

On examination, the patient was healthy looking, conscious and alert and showed normal developmental milestones. The weight was 3.2kg. The cardiovascular, respiratory and genitourinary system examination was normal. The musculoskeletal system examination revealed gross shortening of the proximal part of the right lower limb from the hip to the knee (i.e. the thigh) which was mal-rotated. The right leg i.e. from the knee to the foot appeared normal. The left lower limb and other musculoskeletal system examination were normal. Plain x-ray of both lower limb and pelvis revealed that only a hypoplastic portion of the right distal femur in which the proximal end appeared clubbed was present in association with a poorly developed acetabular roof. There was also a delayed appearance of the epiphyseal ossification centres around the ipsilateral knee joint compared to the other knee (Figure 1). The tibia and fibular were normal bilaterally. The left femur was also normal.
The abdominal organs appeared normal on ultrasound scan.

An impression of proximal femoral focal deficiency was made and the patient was referred to the orthopaedic surgeon, who informed the parents that the child will need to undergo a surgical operation to correct the leg length discrepancy. This was rejected by the parents who subsequently discharged the child from the hospital against medical advice.

![Figure 1: Plain X-ray showing hypoplastic right femur (black arrow) with delayed appearance of epiphysial ossification around the right knee](image)

**Discussion**

Proximal femoral focal deficiency is an uncommon defect that involves the femur and acetabulum, as was noted in this case presented, in varying degrees.\(^1,2\) It is often associated with hypoplasia or absence of the fibula and undergrowth of the tibia. Fibula hemimelia occur in about 50% of patients with proximal femoral focal deficiency.\(^5\) The tibia and fibula were however normal in this case presented. Proximal femoral focal deficiency can be unilateral as it was in the case of this patient presented, or bilateral and it is characterised by limb malrotation, deficiency of iliofemoral articulation and limb length discrepancy which was noted in this case presented.\(^2,6\)

Proximal femoral focal deficiency is thought to result from an early disturbance of growing mesenchyme. Boden *et al*\(^7\) carried out a study of the histopathology of the growth plates and epiphyses from a twenty-one-week-old fetus with unilateral proximal femoral focal deficiency and discovered that the growth plate of the proximal part of the involved femur was markedly abnormal in contrast to the growth plates from the distal part of the femur and from all other long bones.

There are different classifications by different authors\(^1,8,9\) but the most popular on the basis of degree of severity and chances of functional restoration is by Aitken\(^8\).

**Aitken classification**

**Type A:** The ossification of femoral neck may not be visible in the neonate but eventually ossification occurs. The femoral head develops relatively normally and acetabular roof is well formed. A coxa vara deformity is present.

**Type B:** A femoral head is present and acetabular roof is reasonably well formed. However, a defect between shaft and neck of the femur persists and hip is unstable. The upper femoral shaft usually is bulbous.

**Type C:** A femoral head does not develop or is vestigial. The proximal end of the underdeveloped femur is bulbous or clubbed and acetabular roof is poorly developed. The hip is very unstable.

**Type D:** There is a “pencil sharpened” type deformity of the femur present. There is no femoral head, the acetabular roof is totally dysplastic and the hip is completely unstable.

The patient presented in this case, falls under type C of the above classification.

Plain films will show the shortened femur as the case was in this patient, as well as the commonly associated fibula hypoplasia which was not present in this case or absence and delayed appearance of the ossification centres around the knee when present. The femoral head does not develop as the case was in this patient presented, in severe cases and some indication of whether it is present or not can be inferred by the degree of development of the acetabular roof which was poor in this case on plain radiograph. However, in some cases arthrography is required to demonstrate its presence. In very mild cases ossification between the femoral head and shaft eventually occurs but coxa vara deformity persists. In addition, a few of these cases can develop a pseudoarthrosis through the femoral neck. In its mildest form this condition is referred to as congenital coxa vara. In these cases, the femoral neck is relatively well developed but the femur still is a little...
short and a coxa vara deformity is clearly present. In the more severe cases the proximal end of the remaining femoral shaft has a “pencil sharpened” appearance.\textsuperscript{1,9} In the case of this patient presented the proximal end was clubbed.

Magnetic resonance imaging can demonstrate the non-osified cartilaginous femoral capital epiphysis, thus obviating the need for invasive diagnostic procedures and facilitating early classification.\textsuperscript{1,10} Pirani et al.\textsuperscript{8} examined the soft tissue anatomy of Aitken types A, B, C and D of proximal femoral focal deficiency using magnetic resonance imaging and a characteristic pattern of soft tissue abnormalities was described. All muscles were present, but most were smaller than their normal counterparts. The exception was obturator externus muscle which was elongated and remained muscular almost up to its insertion. In type A proximal femoral focal deficiency it is straight; in types B, C and D it is L-shaped. The sartorius is hypertrophied. Ultrasonography can be used to make prenatal diagnosis of proximal femoral focal deficiency.\textsuperscript{3}

Children with proximal femoral focal deficiency and their families are faced with many treatment decisions, both non-surgical and surgical. Nursing care is central in the care of these children and their families both for psychological support and teaching during the decision-making process so as to help meet post-operative and rehabilitation goals.\textsuperscript{2} Treatment objectives include pelvic-femoral stability, prosthetic management, extremity length equality, knee stability and anatomical alignment.\textsuperscript{11} There is a need for early radiologic classification for surgical planning and treatment.\textsuperscript{10} The milder forms of proximal femoral focal deficiency are quite amenable to therapy but the other types are not. The leg length discrepancy in patients with proximal femoral focal deficiency is difficult to treat and is often unmanageable except by amputation at the level of the ankle joint and subsequent prosthetic fitting in the manner used for above knee amputee.\textsuperscript{12} The management of Proximal femoral focal deficiency requires a multidisciplinary team, which includes the pediatric orthopedic surgeon, prosthetists and physical therapists. The goals of treatment are to compensate for the functional deficits. No single treatment approach applies to all cases. Each person with the anomaly must be assessed individually.

In Nigeria and other developing countries where poverty level is high, the people do not generally accept amputation due to sociocultural and economic reasons and thus the disease remains a tragedy for a family that have one.

**Summary**

A 4-day old baby with proximal femoral focal deficiency is presented. The radiologic diagnosis, classification and associated anomalies were discussed. The fact that the management of the condition involves a multidisciplinary team was also discussed. The treatment available for this disorder makes it a tragedy for a family with it in developing countries, where high cost of treatment, poverty and lack of adequately trained personnel join together to make prognosis less favourable.

**References**