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The Scourge of Lassa Fever in West Africa: Aspects of Epidemiology, Clinical Features and Laboratory Diagnosis

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Abstract

Lassa fever is one of the devastating viral disease in West Africa that is less understood, under-diagnosed and under-reported. Its variable and non-specific clinical manifestations coupled with the dearth of diagnostic facilities and assays for quick detection of the disease remain great challenges to the management and control of the disease. In recent years, great progress has been made in unraveling the epidemiology and clinical course of the disease and new technologies have been developed for better diagnosis. The aim of this article is to present some emerging knowledge on the epidemiology, clinical course, diagnosis, and management the disease.

Keywords: Lassa Fever, West Africa, Epidemiology, Clinical Features

Introduction

Lassa fever, a viral haemorrhagic fever is one of the neglected tropical diseases that continue to ravage the West Africa sub-region. Since 1969 when the first cases were seen in North Eastern Nigeria¹, followed by the identification and isolation of Lassa virus in 1972², several outbreaks have been reported, especially in Guinea, Liberia, Sierra Leone and Nigeria, where the disease is now considered endemic³,⁴,⁵. The true public health burden and transmission cycle of Lassa fever is not fully understood. The clinical presentation of Lassa fever resembles that of other febrile illnesses that are endemic in West Africa, thus posing diagnostic dilemma. Interestingly, these challenges are being mitigated by the fast evolution of knowledge in the trend of the disease, including laboratory diagnosis and treatment.

Epidemiology

Etiology and Transmission

Lassa virus is the causative agent of Lassa fever. The Lassa virus is an enveloped RNA virus, belonging to the family of arenaviridae. It is a rodent borne virus with two RNA segments that are negatively strand. The reservoir for Lassa virus is the multimammate rat of the genus Mastomys natalensis, a peri-domestic rat which is ubiquitous in many households in the endemic area of sub-sahara Africa⁶,⁷. The rodent is chronically infected and asymptomatic, but shed the virus in urine and faeces⁸.

Two modes of transmission have been recognized; namely primary and secondary transmission. Primary transmission is via consumption of contaminated food, inhalation of aerosolized droplets from the rat, direct contact of the excreta with broken skin or mucous membrane, and hunting and consumption of rat as food in endemic areas⁹,¹⁰. More than 50% of rodents caught in households in endemic areas were found to be mastomys, with a high proportion being infected with Lassa virus¹¹,¹². Mastomys found in houses of infected people were seropositive for the virus 10 times more often than those found in control houses¹². Among dwellers in endemic area, the prevalence of Lassa specific antibodies following febrile illness is twice higher in people who eat rats than those who do not⁹.

Despite mounting evidence confirming mastomys as the primary reservoir of Lassa virus and the source of
primary infection, it is intriguing that the distribution of mastomys in West, Central and East Africa is far wider than the known distribution of Lassa fever. Many reasons could be adduced for this discordant eco-epidemiology; first, Lassa fever occurs in some yet to be recognized mastomy- endemic area. Second, genetic disparity and variation in susceptibility of sub-populations of mastomys in different areas is a possibility. Third, climatic and other abiotic factors such as rainfall, temperature, humidity, altitude and vegetation may play some role in maintaining the ecology of the rodent and ensuring survival of the virus outside the host in the endemic area. The seasonality of Lassa fever attests to the possible role of climatic factors in influencing the rodent dynamics and transmission of the disease. Studies in Nigeria, Sierra Leone and Guinea have demonstrated that the incidence of Lassa fever is highest in the dry season than during the raining season [13,14,15]. The high incidence of Lassa fever during the dry season has been attributed partly to the massive movement of the rodents from surrounding bushes to nearby houses due to bush burning during this period. Also, viral aerosol stability seems to be higher when the humidity is lower during dry season, thereby favoring transmissibility [10,14].

It has been hypothesized that whereas Lassa virus, outside the host, requires a combination and variation of climatic factors, especially rainfall and humidity, within a narrow range, for its persistence, the mastomys host can exist and do occur over regions experiencing a much wider range of these conditions [5]. Further comprehensive and extensive study of the prevalence of Lassa fever in all mastomy endemic areas, including seasonal changes, distribution, movement and habits of mastomys are required.

Secondary transmission from human–to-human may occur at community level, but commonly as nosocomial outbreak. Such transmission is driven by unprotected contact with excreta and other body fluid and secretions from infected patients or inhalation of droplets [16,17,18,19]. Vertical transmission from mother to fetus through the placenta can also occur [19,20]. Lassa virus has also been recovered from breast milk (unpublished report from ISTH, Irrua), raising the possibility of mother-to-child transmission during breast feeding. Also, Lassa virus has been isolated from semen of survivors of Lassa fever 12 weeks after recovery [21], suggesting the possibility of sexual transmission. However, the extent of sexual transmission has not been established. Epidemiologically, it is difficult to distinguish between cases of primary and secondary transmission as the basic transmission cycle, the interplay in virus-rodent-human dynamics, is poorly understood.

Prevalence and Incidence

The true public health burden of Lassa fever is not known. Analysis based on figures for rural population, available from the United Nations Development Program, puts the “at risk” seronegative population in Sierra Leone, Guinea, and Nigeria at 59 million, with an annual incidence of illness of three million, fatalities up to 67000 and three million re-infection [7]. These figures could be much higher if data were available from other West Africa countries where seropositivity have been reported.

Seroprevalence of Lassa-specific antibodies in the general population is 8%-52% in Sierra Leone [3], 4%-55% in Guinea [22] and 21% in Nigeria [23]. Historical facts from cases imported to Germany and evidence from serological surveys indicate that Lassa fever also exist in Cote D’Ivoire, Mali, Democratic Republic of Congo, Central Africa Republic, Ghana, and Burkina Faso [24,25,26]. Globally, more than 20 cases of imported Lassa fever have been reported outside Africa, including, United States of America, Canada, and Britain [27,28,29].

Morbidity and Mortality

The proportion of hospital admission due to lassa fever is 10%-16% in Sierra Leone, 0-15% in Guinea and 14.3% in Liberia [13,14,30]. Case Fatality Rate (CFR) from community-based study is 1%-2% [3], while among hospitalized patients it is 31% in Nigeria [15] and between 9.3%-18% in other West African countries [13,14,30,31,32]. During nosocomial outbreak, CFR as high as 36%-65% has been reported [13,34,35,36]. The difference in case fatalities reported across the endemic countries may reflect varying level of patient care, severity of cases at presentation or biological variation in the virus. There is no strong evidence associating Lassa fever with sex, race and occupation, but age related pattern has been reported [15].

Laboratory Diagnosis

Due to the difficulty in diagnosing Lassa fever based on clinical parameters, laboratory investigations are
Serological diagnostic approach based on enzyme linked immunosorbent assays (ELISA) are fast evolving and are still being validated. Antigen-capture ELISA can detect viral antigen in blood early in the course of illness, but less sensitive than culture. Antibody ELISA can detect Lassa virus specific IgM and IgG in only about 50% of patients in the first days of illness, while some patients with severe and fatal Lassa fever may not develop antibodies at all. Furthermore, there is persistence of IgM antibodies in the serum of survivors of Lassa fever for a long period. Thus, from serological point of view, antigen ELISA is preferable in detecting acute Lassa fever, while antibody ELISA is the method of choice for diagnosis in the convalescent phase of the disease.

Currently, the method of choice for the rapid and early diagnosis of Lassa fever is the Reversed Transcriptase Polymerase Chain Reaction (RT-PCR). RT-PCR can detect Lassa virus in 80 to 100% of patients in between day 3 and day 9 of illness. Real-time PCR assays are also available for viral load quantification and are useful in monitoring response to therapy.

**Clinical trend of Lassa fever**

The incubation period for Lassa fever is 6-21 days. The clinical course is highly variable, making it difficult to distinguish Lassa fever from other common febrile illnesses such as malaria, typhoid and influenza, which are also common in endemic areas. Eighty percent of people infected with Lassa virus have subclinical or no obvious symptoms while 20% present with a wide spectrum of systemic manifestations. Lassa fever is essentially an acute disease; the duration of illness is usually two to three weeks, with half of the patients spending 10 days in the hospital before discharge. Death among hospitalized patients usually occur within five days of admission with more than half succumbing within two day and half of the patients presenting at day six or later after onset of illness.

Onset of illness is insidious, starting with fever, general weakness, and malaise. After a few days, headache, sore throat, muscle pain, chest pain, nausea, vomiting, diarrhoea, cough, and abdominal may follow. Severe cases may progress to show facial swelling, pleural and pericardial effusion, bleeding from mucosa surfaces, low blood pressure, shock and renal failure. Mucosal bleeding may manifest as melena, hemoptysis, haematuria, haematochezia, haematemesis, and vagina bleeding. Lassa fever has been diagnosed among surgical patients who presented with acute abdomen, characterized with extensive intra-operative bleeding and oozing of blood from suture sites postoperatively. Although, Lassa fever is referred to as haemorrhagic fever, a review of previous reports of abnormal bleeding in Lassa fever suggest that bleeding is not a sensitive clinical sign of Lassa fever, as only a small proportion of patients bleed. Indeed the degree of bleeding in Lassa fever is often not significant to explain the shock commonly seen in the terminal stage of the disease; supporting the argument that Lassa fever is not a haemorrhagic fever.

Neurological complications such as confusion, tremor, seizures, ataxia, neuropsychiatric syndrome and coma may occur in 41% of cases, especially at the terminal stage. Sensorineural hearing loss is a common neurological sequela of Lassa fever, occurring in 15-20% of confirmed cases and is likely due to VIII cranial nerve or cochlear damage resulting from immune response to Lassa virus. There is no established relationship between severity of illness and the frequency or degree of hearing loss. The most sensitive clinical diagnostic predictors of lassa fever are fever, pharyngitis, retrosternal pain and proteinuria, while fever, pharyngitis, vomiting and bleeding are predictors of poor prognosis. Clinically, Lassa fever poses a diagnostic dilemma as current case definitions for the disease are not satisfactory. For instance, at Irrua Specialist Teaching Hospital, a centre of excellence for the management of Lassa fever in Nigeria, Lassa fever is suspected in patients with: 1) Fever (temperature ≥ 38°C) for at least 2 days, in which malaria is excluded or 1+, and some or one of the following symptoms: chest pain, sore throat,
headache, muscle pain, vomiting, and diarrhea or, 2) Patients with fever who show bleeding or facial edema or, 3) Patients with fever who do not respond to antimarials or antibiotics after 2 days of treatment or, 4) Patients with fever who had contact with a confirmed Lassa fever case within the last three weeks. Recent evaluation of this criteria revealed that among fatal cases of Lassa fever seen at the hospital, a significant proportion did not have fever at presentation or recorded low temperature at the terminal stage of illness during which they presented. This finding warrants that the existing case definition need to be reviewed, for improved sensitivity, especially in the advance stage of the disease. Lassa fever in children present similarly like adult with mortality of 12-14%. Severe cases are characterized with a triad of generalized edema, abdominal distension, and bleeding. This is referred to as “swollen baby syndrome” and is highly specific with case fatality rate of about 80%. In pregnancy, Lassa fever poses a great threat to both fetus and mother. Vertical transmission of the virus leads to fetal loss and neonatal death in 90% of cases. Maternal death is about 29% and could be up to 80% in the 3rd trimester. Chances of survival is greatly improved by evacuation of the uterus with administration of ribavirin.

The only drug with therapeutic efficacy that is currently available for the treatment of Lassa fever is Ribavirin. It has been demonstrated that administration of ribavirin within 6 days of illness reduced mortality by 90%. Unfortunately, many patients present late beyond the critical first six-day period within which Ribavirin is effective. Another tested treatment modality is immunotherapy, using convalescent plasma. The success of this treatment is limited by the fact that first; the titre of neutralizing antibodies in survivors of Lassa fever is low and some do not produce at all. Second, neutralizing antibodies are strain-specific and may not effectively neutralize heterologous Lassa strain. Further evaluation and investigations aimed at producing broadly reactive and high titre antibody preparations are underway. There is currently no licensed vaccine for Lassa fever. The prognosis of Lassa fever correlates directly with some virological and biochemical markers. Poor outcome is associated with high viraemia (>10^9 TCID50/ml) and or high level of AST (>150 U/L).

Conclusion

Lassa fever is a significant cause of morbidity and mortality in West Africa, which requires a high index of suspicion based on salient clinical features, epidemiologic considerations and specific laboratory investigations for effective management and control.

References


Assessment of Luteal Phase Defect: A Four-Year Review of a North Central Nigerian Assisted Reproductive Centre.

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Abstract

Background: It is a well-known fact that maintenance of pregnancy requires adequate progesterone by the corpus luteum after ovulation and during the early first trimester until placental function is established. Given the importance of ovarian progesterone to implantation and maintaining early pregnancy, evaluating luteal phase abnormality or deficiency as a cause of infertility or pregnancy failure seems plausible.

Aim: This study aimed at determining the prevalence and types of luteal phase defect in clients attending Assisted Reproductive Unit of University of Ilorin Teaching Hospital, Ilorin in view of the importance of progesterone in both the physiology and pathology involved in implantation, maintenance and sustainability of pregnancy most especially at the early stage.

Materials and Method: This was a retrospective cross-sectional study involving two hundred and seventy-six (276) clients being managed at the Assisted Reproductive Technology Unit (ARTU) of the University of Ilorin Teaching Hospital, Ilorin, Kwara State, Nigeria between January 2012 and December 2016.

Results: One hundred and twenty-seven (46.01%) had primary infertility while 149(53.99%) had secondary infertility. Among the clients with primary infertility, twenty-three (8.4%), had anovulatory cycle while 73(26.4%) and 31(11.2%) had luteal phase insufficiency and adequate ovulation respectively. However, in clients with secondary infertility, 10(3.6%), had anovulatory cycle while 25(9.1%) and 114(41.3%) had luteal phase insufficiency and adequate ovulation respectively. About 74.5% of the total LPD occurs in clients with primary infertility.

Conclusion: Biochemical LPD is a common finding among infertile female patients who presented at our Assisted Reproductive Unit of UITH Ilorin, commonly occurring in clients with primary infertility. Therefore, carrying out day 21-28 serum progesterone (based on cycle length) as part of routine evaluation of such patients to diagnose and manage LPD promptly, cannot be over emphasized.

Keywords: Luteal Phase Defect, Infertility, Nigerian, Assisted Reproductive Unit

Introduction

Infertility, according to World Health Organization is a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse (and there is no other reason, such as breastfeeding or postpartum amenorrhea).1 Primary infertility is infertility in a couple who have never had a child. Secondary infertility is failure to conceive following a previous pregnancy. Infertility may be caused by infection in the man or woman, but often there is no obvious underlying cause. A couple that tries unsuccessfully to have a child after a certain period (often a short period, but definitions vary) is sometimes said to be sub fertile, meaning less fertile than a typical couple. Both infertility and sub fertility are defined as
the inability to conceive after a certain period (the length of which vary), so often the two terms overlap. Various biochemical causes of infertility have been suggested of which Luteal phase insufficiency or defect (LPI/LPD) is one of them.

Luteal phase insufficiency or defect (LPI/LPD) is the inability of the endometrium to successfully undergo secretory transformation post-ovulation resulting from deficient progesterone production or deficient endometrial response to normal luteal phase serum progesterone level.² This clinical condition was first identified by Jones in 1949.³ It is one of the components of a spectrum of ovulatory disorders ranging from LPD to oligo-ovulation and chronic anovulation.⁴

LPD has been implicated in female infertility, recurrent pregnancy loss and unsuccessful assisted reproduction. One of the reasons for these is implantation failure due to deficiency of progesterone, produced by the corpus luteum, required to maintain the developing embryo before the development of placenta.⁵ Transfer of luteal support to placenta occurs between seventh and ninth week and progesterone production from both sources continues to varying extent during the time period known as luteal-placental shift.⁶

The major mechanisms of luteal phase insufficiency include: abnormal folliculogenesis, abnormal luteinization, uterine abnormalities and hypocholesterolemia (due to deficiency of cholesterol which is the raw material for synthesis of gonadal steroid hormones). LPD is also seen in patients with polycystic ovarian syndrome, thyroid disorders and hyperprolactinemia, all independent causes of infertility, making the diagnosis of LPD difficult and sometimes confusing.

This study aimed at determining the prevalence and types of luteal phase abnormality in clients attending Assisted Reproductive Unit of University of Ilorin Teaching Hospital, Ilorin in view of the importance of progesterone in both the physiology and pathology involved in implantation, maintenance and sustainability of early pregnancy.

Materials and Method

The study was a retrospective cross sectional one involving two hundred and seventy-six women who were managed at the Artificial Reproductive Technology Unit (ARTU) of the University of Ilorin Teaching Hospital, Ilorin, Kwara State, Nigeria between January 2012 and December 2016. The Unit receives referrals from Gynaecological clinic, General Outpatients’ Department clinic within the hospital and from private and other government owned hospitals within and outside the state, for various cases of infertility. Data were retrieved from laboratory records of infertile women who had day-21-28 serum progesterone done as part of their evaluation for infertility. Patients on progesterone replacement therapy were excluded. Serum Progesterone (P) was analyzed using Accubind ELISA Microwell test kits (Monobind Inc, Lake Forest, CA 92630, USA) 1st of January 2013- 31st of December 2015. The absorbance value for each test was used to determine the corresponding concentration of serum progesterone from the standard curve developed using the kit standards. Internal controls levels 1 and 2 were run with each standard curve as quality control. Progesterone was considered as a marker of ovulation and its serum levels aid in diagnosis of ovulatory disorders.

Levels < 3ng/ml → Anovulation/Anovulatory cycle
Levels 3-9 ng/ml → Ovulation with luteal phase insufficiency
Levels ≥ 10ng/ml → Adequate ovulation/Ovulatory cycle with sufficient luteal phase

Data Analysis

Data were compiled and computed using Microsoft Excel 2010 and analyzed using SPSS. The means and standard deviations were calculated for the two classes of infertility. Percentages were calculated for various biochemical patterns of ovulation (Anovulation, LPD and adequate ovulation).

Results

Table 1 shows that the mean age of the clients in the study was 36.2 ± 6.4 years with highest number of clients (81) within age group 30-34 years and the least number of patients (2) within the age group 50-54 years.

Of the 276 women reviewed in this study, 149 (53.9%) women had secondary infertility while127 (46.01%) had primary infertility (Table 2). The mean duration
of infertility was 6.9 ± 5.4 years with the highest number of clients (138) presenting within 1 to 5-year history of infertility and the least number of patients (2) presenting with 26 to 30-year history of infertility.

Table 1: Age Distribution of Infertile Clients that attended the Reproductive Unit within the Study Period

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Frequency</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>20 - 24</td>
<td>2</td>
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<td>7.97</td>
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<tr>
<td>50-54</td>
<td>8</td>
<td>2.90</td>
</tr>
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</table>

Range= 20- 54  Mean= 36.2±6.4

Table 2: Duration and of Infertility

<table>
<thead>
<tr>
<th>Duration (Years)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>1-5</td>
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<tr>
<td>21-25</td>
<td>5</td>
<td>1.81</td>
</tr>
<tr>
<td>26-30</td>
<td>2</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Range= 1 - 26  Mean= 6.9±5.4

Table 3 shows that thirty-three women (12.0%) were anovulatory, with 23 (8.4%) and 10 (3.6%) women presenting as primary and secondary infertility respectively. Ninety-eight women (35.5%) had luteal phase defect (LPD), 73 (26.4%) of the clients had primary infertility while 25 (9.1%) clients having secondary infertility.

Table 3: Class distribution of infertile clients that attended the reproductive unit.

<table>
<thead>
<tr>
<th>Type of Infertility</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>127</td>
<td>46.01</td>
</tr>
<tr>
<td>Secondary</td>
<td>149</td>
<td>53.99</td>
</tr>
<tr>
<td>Total</td>
<td>276</td>
<td>100.0</td>
</tr>
</tbody>
</table>

One hundred and forty-five women (52.5%) had adequate ovulation with sufficient luteal phase, 31 (11.2%) of the clients had primary infertility and 114 (41.3%) had secondary infertility as shown in Table 4.

Table 4: Pattern of Luteal Phase Deficiency among the Classes of Infertility

<table>
<thead>
<tr>
<th>Progesterone ng/ml (Day 21-28)</th>
<th>Frequency of Primary Infertility</th>
<th>Frequency of Secondary Infertility</th>
<th>Total Frequency</th>
<th>% Primary</th>
<th>% Secondary</th>
<th>Total Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3</td>
<td>23</td>
<td>10</td>
<td>33</td>
<td>8.4</td>
<td>3.6</td>
<td>12.0</td>
</tr>
<tr>
<td>3-10</td>
<td>73</td>
<td>25</td>
<td>98</td>
<td>26.4</td>
<td>9.1</td>
<td>35.5</td>
</tr>
<tr>
<td>&gt;10</td>
<td>31</td>
<td>114</td>
<td>145</td>
<td>11.2</td>
<td>41.3</td>
<td>52.5</td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td>149</td>
<td>276</td>
<td>46.01</td>
<td>53.99</td>
<td>100</td>
</tr>
</tbody>
</table>

Discussion

The mean duration of infertility prior the clients’ presentation at the Assisted Reproductive Unit of the Teaching Hospital in this study was 6.9±5.4 years. This delayed period before presentation may be a result of delayed presentation or referral for management of infertility at specialist centres such as ours. It may also be due to reluctance of patients to access IVF centres because of the relatively high cost of care, particularly in developing countries like Nigeria.

One hundred and thirty-one (47.5%) in our study had luteal phase defect (LPD). This prevalence was higher than 8.4% of biochemical LPD obtained by Schliep et al in a prospective conducted in western New York and 2.5% obtained Isah I A at Zaria, Northwest Nigeria. It is however a bit like a study by A. Abass in Kumasi where the prevalence was 35.0%. The high prevalence rate in our study may be because we manage mainly infertility cases requiring artificial reproductive techniques. This also shows that luteal phase defect is a common cause of infertility and one of the reasons for presentation at IVF centres. Since LPD has been implicated as a cause of recurrent pregnancy loss and unsuccessful assisted reproduction, it is very important to evaluate all cases of infertility for LPD and ensure hormonal replacement, either by administering human chorionic gonadotrophin (HCG) or progesterone, to correct the hormonal deficiency, until there is a successful luteo-placental shift. This shift transfers the responsibility of fetal hormonal support to the placenta and increases the chance of fetal survival throughout the duration of a normal pregnancy.
However, despite numerous studies linking LPD to aetiopathogenesis of female infertility, the American Society for Reproductive Medicine (ASRM) committee cautioned that the evidences are not conclusive yet. This is mainly because almost seven decades after LPD was first described by Jones the diagnostic criteria still remain controversial and inconclusive. The use of mid-luteal serum progesterone assay have been criticized by some researchers because of the variability of serum progesterone levels from low to high values in the luteal phase, thereby limiting its sensitivity as a marker of adequacy of ovulation. Also endometrial biopsy for histology, considered the gold standard in the diagnosis of LPD, has been criticized because of its imprecision mainly from dichotomy between histological finding and urinary detection of LH and poor predictive value of the procedure. Many authorities however, still advocates the use mid-luteal serum progesterone in diagnosis of LPD as supported by the high prevalence in our study.

Conclusion

Biochemical LPD is a common finding among infertile female patients who presented at our Assisted Reproductive Unit of UITH, Ilorin therefore carrying out day 21-28 serum progesterone as part of routine evaluation of such patients to diagnose and manage LPD promptly, cannot be over emphasized. Most of the LPDs occurring in clients with primary infertility.

References

7. Isah IA. Pattern of reproductive hormones in women with infertility Zaria, Northern Nigeria. Thesis submitted to the Department of Chemical Pathology, Faculty of Medicine, Ahmadu Bello University, Zaria, 2009.
Assessment of hand washing awareness and practices among food vendors in Ekpoma, South -South, Nigeria

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2 Ambrose Alli University, Ekpoma, Edo state, Nigeria

Abstract

Background: Hand washing is one of the strategies for the prevention of disease cross-contamination from food handlers to their customers or consumers. Poor hand washing practices of food handlers often contributes to food borne-illness outbreaks with associated fatalities. To guide public health decisions on food safety especially in developing countries like Nigeria, it is imperative that regular information on the practices of food handlers such as hand washing is made available.

Objective: The study sought to assess the awareness and practice of hand washing among food vendors in Ekpoma with a view to making informed recommendations.

Methods: A cross-sectional study utilized cluster sampling technique to select 191 food vendors from the 14 communities in Ekpoma, Edo State, Nigeria. A semi-structured interviewer/self-administered questionnaire was used to collect data on socio-demographic characteristics, knowledge, attitude, frequency, method and factors influencing hand-washing. Data were analyzed and presented in frequency tabulations and cross-tabulations of variables that are associated with hand-washing practices.

Results: Majority (59.2%) of respondents were aged 30 – 39 years with a mean age of 33.7±5.4 years and most of them were female (80.1%). Though all respondents claimed to know that disease transmission could be prevented by hand washing, majority (97.4%) would only do so if provided with soap and water, 95% wash their hands less than six times daily and 94.8% use any available clothing materials to clean hands after washing. Practice was significantly related to age (P<0.0001), but not to sex (P>0.91), educational status (P>0.21) or marital status (P>0.24). Only 7.9% of the respondents had received training on hand washing.

Conclusion: Food handling as assessed by hand washing practices amongst food vendors studied in Ekpoma is still a far cry from the ideal. This underscores the need for urgent intervention through intensified monitoring and enforcement of food safety practices by the health department in the Local government area council.

Introduction

Food borne diseases remains a major public health problem globally. In United States, from 2000 to 2007, an estimated 47.8 million food borne illnesses per year was recorded with many hospitalizations (127,839) and deaths (3,037). The World Health Organization (WHO) estimates that diarrhea and respiratory infections are responsible for two-thirds of child deaths. UNICEF estimates that diarrhea alone kills one child every 30 seconds. Most diarrheal diseases are caused by fecal-oral contamination.

These childhood diarrheal diseases and deaths have been linked to improper handling of food, of which food vendors play a major role in transmitting pathogens passively from contaminated sources to a ready to eat food. Food handlers may also carry some human specific food-borne pathogens such as Hepatitis A, noroviruses, typhoidal Salmonella, Staphylococcus aureus and Shigella sp in their hands, cuts or sores, mouth, skin and hair. In developing countries up to an estimated 70% of cases of diarrheal diseases are associated with consumption of contaminated food. In Nigeria, over 150,000 deaths occur annually among children due to diarrhea. A simple hygiene habit of washing hands with soap could half this figure. Diarrheal is both preventable and treatable, yet families in developing countries continue...
to experience loss of lives, absenteeism from school and work, reduce resistance to infections, impaired growth, malnutrition and poverty\textsuperscript{10}. Food contamination can occur at any point during its preparation, bringing to the fore the importance of food safety and hygiene in the prevention of food borne diseases\textsuperscript{28, 29, 30}.

According to Center for Disease Control\textsuperscript{11}, hand washing is the simplest, most effective measure for preventing the spread of bacteria, pathogens and viruses. Even with this knowledge, many persons do not wash their hands. Recent studies by the American Society for Microbiology (2000) indicate that only 67\% of Americans wash their hands after going to the bathroom, 78\% after changing diapers and 77\% before handling or eating food. Forty-five percent of Americans report that they do not wash up after petting an animal, 31\% after coughing or sneezing and 20\% after handling money\textsuperscript{32}. If this is obtainable in a developed country like America, worse case scenarios are expected in a developing country like Nigeria where level of personal hygiene is still very poor. Hand hygiene is any action of hygienic hand antisepsis to reduce transient microbial flora (generally performed either by hand rubbing with an alcohol-based formulation or hand washing with plain or antimicrobial soap and water)\textsuperscript{3}. The hand can contact major parts of the body surfaces and external environment; hence it plays a crucial role in the transmission and spread of infectious diseases which can be bacterial, viral, food-borne illnesses and infections that are hospital acquired (nosocomial)\textsuperscript{4}. Infectious microorganisms on the hands are the most common ways through which food vendors spread infections among themselves, family members and those who patronizes them. This occurs when they rub their nose, eyes or touching their mouth with an already contaminated hand. While restaurants, canteens, fast foods and street food vendors are an important source of ready to eat at times low cost meals, they could also pose serious health risk to the unsuspecting public. This is because unhygienic preparation of food provides ample opportunities for contamination with harmful micro-organisms usually carried on hands.\textsuperscript{5}

Poor sanitary conditions, lack of knowledge of food handlers about hand washing, under staffing, failure of the staff to follow protocol and lack of safe water are observed commonly in our restaurants. Food handlers play an important role in ensuring food safety throughout the chain of production, processing, storage and preparation of food\textsuperscript{10}. As it has been reported that food borne illnesses outbreaks originate in food service establishments\textsuperscript{6}, and sporadic food borne illnesses have been associated with having eaten outside the home\textsuperscript{7, 8}, therefore, food handler’s poor hand washing practice is an important contributor to food borne illness\textsuperscript{9, 6}. In one study food handlers were identified as the main cause of food contamination\textsuperscript{14}. Evidence shows that hand washing can reduce the occurrence of diarrhea diseases by 14-40\%.\textsuperscript{15} It has also been reported that a range of personal, social, and environmental factors influence food handlers practices and that these factors need to be addressed to change food handlers’ behavior\textsuperscript{16, 17} and \textsuperscript{18}. In the study done in 2012 on food safety knowledge, attitude and hygiene practices among the street food vendors in Northern Kuching City, Sarawak, Malaysia practice was poor with a percentage score of 16.9\% which was consistent with their poor knowledge and attitude. Training in food safety significantly increased the food safety practice and it was 4.039 times higher in good practice compared to no training in food safety\textsuperscript{41}. A study done in 2015 on knowledge, attitude and practice of food safety and hygiene among food vendors in primary schools in Jos, Plateau State, North Central Nigeria, revealed that only 21.3\% of the respondents practiced hand washing with soap and water before and after preparing food always. Age of the respondents showed statistically significant relationship with practice of food safety and hygiene (P<0.001). Similarly, level of education of the food vendors, knowledge of food safety and attendance of food safety and hygiene training had statistical significant influence on the practice of hand washing/food safety and hygiene\textsuperscript{44}. This differed from a study done to assess food hygiene practices of 168 food vendors in 2014 at Abuja Nigeria where 150(89.3\%) of them wash their hands after using the toilets, whereas only 44(26.7\%) change their hand gloves at work\textsuperscript{48}.

Certain hand washing guidelines have been setup by various regulatory agencies for hospitals, food preparation centers, preschools, and daycares. The World Health Organization recommends that hands be washed before, during, and after preparing food, before eating food, after using the toilet facility, after changing diapers of cleaning up a child who has used...
the toilet, before and after caring for someone who is sick, after coughing or sneezing, after touching an animal or animal waste, before and after treating a cut or wound. Dry your hand using a clean towel or air dry after.

Food vendors are an important source of ready to eat at times low cost meals. Unhygienic preparation of food provides ample opportunities for contamination and cross-contamination through harmful micro-organism which are carried on hands, leading to growth or survival of pathogens in food thereby causing food borne diseases.

Education of food handlers has been recommended as a means of improving food handling practices and thus the safety of food. There is, however, paucity of documentary evidence of improvements in food hygiene standards which can be directly related to education or training. It is thus imperative that an assessment be conducted to assess what information food vendors have, their attitude towards such information and how much they practice this in relation to food safety. Such an assessment has potential to identify areas that require strengthening or attention in the training programme with regard to ensuring the safety of street foods, especially for vulnerable groups. Additionally, legislative changes that may be necessary in light of such an assessment could be suggested. This study therefore sought to assess food vendors regarding food hygiene and safety by focusing on their hand washing practices.

**Method**

**Study Area**

This study was carried out in Ekpoma the administrative headquarter of Esan West Local Government Area of Edo State, Nigeria. It harbors the Ambrose Alli University community, several banks, small businesses, secondary and primary schools, churches, etc. Because of these various commercial, administrative and academic activities in the area, it is undergoing a development from a rural to a semi-urban area, and therefore a fast growth of food vending services to meet the demand of the growing population. There are sixteen (16) hotels in Ekpoma, several fast food eateries, canteens, restaurants and bars, wheelbarrow (mobile) food sellers, etc., which are unevenly distributed across the area with concentration around the town (Eguare). Majority of the population are undergraduates, lecturers and teachers, pupils, farmers, traders and small business owners. The major communities within Ekpoma include Ujemen, Iruekpen, Ihumudumu, Ujoelen, Eguare, Emuado, Illele, Eke, Uhiele, Ukpenu, Igbor, Igboro, Ebhuahkuala and Idumebo. Indigenes speak Esan and the major occupation among them is farming and trading. Food preference is predominantly rice, beans, pounded yam and cassava.

**Study Design:** It was a cross sectional descriptive study.

**Study Population:** Food vendors in Ekpoma that have no reserved parking area but had a dining area such as the canteens, restaurants and bars.

**Study Duration:** This study lasted for a period of 6 months (from February to August 2016).

**Sample Size Determination:** Using the Cochrane formula for single proportions a sample size of 191 food vendors was derived.

**Sampling Technique:** Cluster sampling technique was adopted. Each community in Ekpoma represented a cluster. A cluster was randomly selected by balloting, and all the food vendors present in the randomly selected cluster were interviewed. Without replacement, other clusters were randomly selected until the sample size was completed.

**Data Collection**

A total of 200 semi-structured, interviewer/self-administered questionnaires were administered with five sections which include: introduction and informed consent, socio-demographics of respondents, knowledge on hand washing, attitude and practice of hand washing, and factors influencing hand washing. Questionnaires were interpreted in Pidgin English and Ishan dialect.

**Measurement of Variables**

All questions were allotted the same percentage and correct answers awarded a score of 1 mark each. A percentage score of 75% - 100% was regarded as “good” while 50% - 74.99% was regarded as “fair” and <50% “poor”.

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Data Analysis
Data collected was analyzed using SPSS Version 20. Summary statistics for mean, percentages as well as standard deviation were used where appropriate. Chi square test was performed for significance analysis and measure of dispersion. Level of significance was set at P ≤ 0.05.

Ethical Consideration
The research was approved by the Community Medicine Department, Ambrose Alli University Ekpoma. The head of each food vending stand or eatery was properly informed about the aim of the study and method of data collection. Informed consent was obtained from all the subjects before commencement of data collection.

Results
Two hundred questionnaires were distributed, while one hundred and ninety-one were collected in and analyzed using SPSS version 20.

Table 1: Socio-demographic characteristics of respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency (n=191)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>48</td>
<td>(25.1)</td>
</tr>
<tr>
<td>30-39</td>
<td>113</td>
<td>(59.2)</td>
</tr>
<tr>
<td>40-49</td>
<td>30</td>
<td>(15.7)</td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>33.7±5.4</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>38</td>
<td>(19.9)</td>
</tr>
<tr>
<td>Female</td>
<td>153</td>
<td>(80.1)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>40</td>
<td>(20.9)</td>
</tr>
<tr>
<td>Married</td>
<td>151</td>
<td>(79.1)</td>
</tr>
<tr>
<td>Educational Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>63</td>
<td>(33.0)</td>
</tr>
<tr>
<td>Secondary</td>
<td>104</td>
<td>(54.4)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>24</td>
<td>(12.6)</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>177</td>
<td>(92.7)</td>
</tr>
<tr>
<td>Islam</td>
<td>14</td>
<td>(7.3)</td>
</tr>
<tr>
<td>Ethnicity/tribe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esan</td>
<td>109</td>
<td>(57.1)</td>
</tr>
<tr>
<td>Bini</td>
<td>48</td>
<td>(25.1)</td>
</tr>
<tr>
<td>Etsako</td>
<td>14</td>
<td>(7.3)</td>
</tr>
<tr>
<td>Owan</td>
<td>20</td>
<td>(10.5)</td>
</tr>
</tbody>
</table>

Socio-demographic characteristics: The mean age of respondents was 33.7±5.4 years. Majority [113(59.2%)] of the respondents were between 30-39 years, female (80.1%), married (79.1%), attained secondary level of education (54.5%), practiced Christianity (92.7%), and were Esan (57.1%) by tribe(Table 1).

Awareness of Hand washing as a necessity in food handling: Most (97.4%) of the respondents were aware of hand washing (fig 1)

Knowledge of hand washing and preventive actions: Majority of the respondents could define hand washing correctly (64.9%), knew the mode of transmission of microorganisms from vendors and consumers (97.9%), and the most frequent means through which microorganisms from food can make consumers ill (57.6%). Only 7.9% had received training on hand washing, while 92.1% had not.

Fig 1: A Pie Chart showing awareness of Hand washing

(Table 2). Majority of the respondents knew that transmission of pathogenic organisms could be prevented by hand washing before touching food (100%), immediately after changing child’s diapers (97.4%), after urinating (52.9%), after defecating (97.4%), while majority didn’t know that transmission of germs could be prevented by hand washing after exposure to immediate food vendor’s surroundings (77.5%) and after picking the nose (77.5%) (Table3).

Practice of hand washing: Majority of the respondents practiced hand washing ‘most times’ before resuming work in the morning (57.6%), before eating (67.5%), after handling raw meat and other raw materials(63.4%), before handling any ready to eat
food (51.3%), and at close of work (53.9%), while majority practiced hand washing ‘always’ after eating (62.3%) and when they think their hands are dirty (56.0%). Also, most of the respondents practiced hand washing ‘rarely’ before serving food (52.9%). (Table 4).

**Table 2: Hand washing knowledge**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you received formal training in hand washing since you started this work?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>(7.9)</td>
</tr>
<tr>
<td>No</td>
<td>176</td>
<td>(92.1)</td>
</tr>
<tr>
<td>If yes, how many training on hand washing have you attended since you started this work?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>10</td>
<td>(66.7)</td>
</tr>
<tr>
<td>Two</td>
<td>5</td>
<td>(33.3)</td>
</tr>
<tr>
<td>Where was it held?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At market place</td>
<td>15</td>
<td>(100.0)</td>
</tr>
<tr>
<td>At local government secretariat</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Who were the organizers?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colleagues</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>NGO</td>
<td>5</td>
<td>(33.3)</td>
</tr>
<tr>
<td>Local government</td>
<td>10</td>
<td>(66.7)</td>
</tr>
<tr>
<td>NAFDAC</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Hand washing refers to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scrubbing hands using plain soap and water</td>
<td>29</td>
<td>(15.2)</td>
</tr>
<tr>
<td>Scrubbing hands using antiseptic soap and water</td>
<td>38</td>
<td>(19.9)</td>
</tr>
<tr>
<td>All of the above</td>
<td>124</td>
<td>(64.9)</td>
</tr>
<tr>
<td>Cleaning the hands with towel only</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Which of the following is the main way through which germs move from food vendors and consumers?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food vendor’s hand when not clean</td>
<td>187</td>
<td>(97.9)</td>
</tr>
<tr>
<td>Air circulating in the environment</td>
<td>4</td>
<td>(2.1)</td>
</tr>
<tr>
<td>Consumers exposed to colonized surface (chairs, tables, floors)</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Sharing non-invasive objects (knives, fork, spoon) between consumers</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>0</td>
<td>(0)</td>
</tr>
<tr>
<td>Which is the most frequent means through which germs from food can make consumers ill?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The food vendor’s hands and practices</td>
<td>110</td>
<td>(57.6)</td>
</tr>
<tr>
<td>Germ already present on or within the consumer</td>
<td>68</td>
<td>(35.6)</td>
</tr>
<tr>
<td>The air in the environment</td>
<td>4</td>
<td>(2.1)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>9</td>
<td>(4.7)</td>
</tr>
</tbody>
</table>

**Table 3: Hand washing actions that prevent transmission of micro-organisms**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>Don’t know (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before touching food</td>
<td>191 (100.0)</td>
<td>0 (.0)</td>
<td>0 (.0)</td>
</tr>
<tr>
<td>Immediately after changing child’s diapers</td>
<td>186 (97.4)</td>
<td>0 (.0)</td>
<td>5 (2.6)</td>
</tr>
<tr>
<td>After exposure to immediate food vendor’s surroundings</td>
<td>38 (19.9)</td>
<td>5 (2.6)</td>
<td>148 (77.5)</td>
</tr>
<tr>
<td>Immediately before handling food that are ready to eat</td>
<td>93 (48.7)</td>
<td>0 (.0)</td>
<td>98 (51.3)</td>
</tr>
<tr>
<td>After urinating</td>
<td>101 (52.9)</td>
<td>0 (.0)</td>
<td>90 (47.1)</td>
</tr>
<tr>
<td>After defecating</td>
<td>186 (97.4)</td>
<td>0 (.0)</td>
<td>5 (2.6)</td>
</tr>
<tr>
<td>After picking your nose</td>
<td>33 (17.3)</td>
<td>10 (5.2)</td>
<td>148 (77.5)</td>
</tr>
</tbody>
</table>

**Cleaning after hand washing:** Most of the respondents used pieces of cloths (94.8%) for drying their hand following hand washing, while 2.6% each used common napkin and disposable serviettes respectively. (Fig 2)

**Factors influencing hand washing practices:** Majority of the respondents would practice hand washing because it is important to them (93.2%), things for hand washing are available (90.6%), it is effective in protecting their health and that of their customers (82.2%), while none (0%) would wash their hands because they are aware of WHO recommendation nor because someone may be watching them. Majority of the respondents would not practice hand washing because of forgetfulness (97.4%), it takes time (85.3%), and not convenient (77.5%), while 34.6% for
lack of water, 35.6% no poster to remind them, 27.2% not being aware of WHO recommendation, and 37.2% for not having any previous training (Table 5).

Table 4: Practice of hand washing

<table>
<thead>
<tr>
<th>Statements</th>
<th>Always (N)</th>
<th>Most times (N)</th>
<th>Rarely (N)</th>
<th>Never (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you wash your hands during the following activities?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before resuming work in the morning</td>
<td>48 (25.1)</td>
<td>110 (57.6)</td>
<td>29 (15.2)</td>
<td>4 (2.1)</td>
</tr>
<tr>
<td>After eating</td>
<td>57 (29.8)</td>
<td>129 (67.5)</td>
<td>5 (2.6)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>After handling raw meat and other raw materials</td>
<td>51 (26.7)</td>
<td>121 (63.4)</td>
<td>19 (9.9)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Before handling any ready to eat food</td>
<td>44 (23.0)</td>
<td>98 (51.3)</td>
<td>49 (25.7)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Before serving food</td>
<td>5 (2.6)</td>
<td>80 (41.9)</td>
<td>101 (52.9)</td>
<td>5 (2.6)</td>
</tr>
<tr>
<td>After serving food</td>
<td>19 (9.9)</td>
<td>86 (45.0)</td>
<td>7 (40.3)</td>
<td>9 (4.7)</td>
</tr>
<tr>
<td>After touching any object in the environment</td>
<td>54 (28.3)</td>
<td>45 (23.6)</td>
<td>92 (48.2)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>When you think your hands are dirty</td>
<td>10 (56.0)</td>
<td>80 (41.9)</td>
<td>0 (0)</td>
<td>4 (2.1)</td>
</tr>
<tr>
<td>At close of work</td>
<td>79 (41.4)</td>
<td>103 (53.9)</td>
<td>0 (0)</td>
<td>9 (4.7)</td>
</tr>
</tbody>
</table>

Table 5: Factors that influence hand washing practices

<table>
<thead>
<tr>
<th>Factors</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasons for Practicing hand washing</td>
<td></td>
</tr>
<tr>
<td>It is important to me</td>
<td>178 (93.2)</td>
</tr>
<tr>
<td>Things for hand washing are available</td>
<td>173 (90.6)</td>
</tr>
<tr>
<td>It is effective in protecting my health and protecting consumer's health</td>
<td>157 (82.2)</td>
</tr>
<tr>
<td>I am aware of WHO recommendation</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Because someone is watching me</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Reasons for not practicing hand washing</td>
<td></td>
</tr>
<tr>
<td>I do forget</td>
<td>186 (97.4)</td>
</tr>
<tr>
<td>Takes time</td>
<td>163 (85.3)</td>
</tr>
<tr>
<td>Not convenient</td>
<td>148 (77.5)</td>
</tr>
<tr>
<td>No water</td>
<td>66 (34.6)</td>
</tr>
<tr>
<td>No soap</td>
<td>5 (2.6)</td>
</tr>
<tr>
<td>No posters to remind me</td>
<td>68 (35.6)</td>
</tr>
<tr>
<td>I am not aware of WHO recommendation</td>
<td>52 (27.2)</td>
</tr>
<tr>
<td>I have no previous training on hand washing</td>
<td>71 (37.2)</td>
</tr>
<tr>
<td>Disagreement with WHO recommendations</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Table 6: Association between socio-demographic characteristics and practice

<table>
<thead>
<tr>
<th>Level of practice</th>
<th>Good N (%)</th>
<th>Fair N (%)</th>
<th>Poor N (%)</th>
<th>X²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>0 (0)</td>
<td>39 (24.8)</td>
<td>9 (37.5)</td>
<td>25.78</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>30-39</td>
<td>10 (100.0)</td>
<td>98 (62.4)</td>
<td>5 (20.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>0 (0)</td>
<td>20 (12.7)</td>
<td>10 (41.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10 (100.0)</td>
<td>157 (100.0)</td>
<td>24 (100.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2 (20.0)</td>
<td>32 (20.4)</td>
<td>4 (16.7)</td>
<td>0.180</td>
<td>0.914</td>
</tr>
<tr>
<td>Female</td>
<td>8 (80.0)</td>
<td>125 (79.6)</td>
<td>20 (83.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10 (100.0)</td>
<td>157 (100.0)</td>
<td>24 (100.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>0 (0)</td>
<td>35 (22.3)</td>
<td>5 (20.8)</td>
<td>2.822</td>
<td>0.244</td>
</tr>
<tr>
<td>Married</td>
<td>10 (100.0)</td>
<td>122 (77.7)</td>
<td>19 (79.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10 (100.0)</td>
<td>157 (100.0)</td>
<td>24 (100.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>5 (50.0)</td>
<td>48 (30.6)</td>
<td>10 (41.7)</td>
<td>5.833</td>
<td>0.212</td>
</tr>
<tr>
<td>Secondary</td>
<td>5 (50.0)</td>
<td>90 (57.3)</td>
<td>9 (37.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>0 (0)</td>
<td>19 (12.1)</td>
<td>5 (20.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10 (100.0)</td>
<td>157 (100.0)</td>
<td>24 (100.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>10 (100.0)</td>
<td>148 (94.3)</td>
<td>19 (79.2)</td>
<td>7.823</td>
<td>0.020*</td>
</tr>
<tr>
<td>Islam</td>
<td>0 (0)</td>
<td>9 (5.7)</td>
<td>5 (20.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10 (100.0)</td>
<td>157 (100.0)</td>
<td>24 (100.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity/tribe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Esan</td>
<td>5 (50.0)</td>
<td>95 (60.5)</td>
<td>9 (37.5)</td>
<td>32.113</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>Etsako</td>
<td>0 (0)</td>
<td>38 (24.2)</td>
<td>10 (41.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owan</td>
<td>5 (50.0)</td>
<td>15 (9.6)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10 (100.0)</td>
<td>157 (100.0)</td>
<td>24 (100.0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at p<0.05

Discussion

In many cities worldwide, food vendors are particularly important source of convenient, affordable food for the urban poor and working classes in both developed and developing countries. Food vending has a major economic impact in many countries and is a major source of employment. They are also a potential source of outbreaks of food borne illnesses. This study provides information on safe food handling with a focus on the awareness level and practices of hand washing among food vendors in Ekpoma, the headquarters of Esan West Local Government Area of Edo State, South-South Nigeria.

Of the total of 191 respondents interviewed, majority 113(59.2%) were between 30-39 years of age with a
mean of 33.7±5.4 years. This was similar to the findings of other studies conducted among food handlers in Nigeria, and Malaysia\textsuperscript{44,39}. The sex distribution showed a female preponderance; female respondents were 153(80.1%) and males, 38(19.9%). This supports the tradition in most parts of Africa where women are usually those that cook the food at family and communal levels and the finding is also comparable to other studies in Nigeria\textsuperscript{52,53,54}. Food vending tends to be mostly for the women folk. Most of the respondents were married (79.1%), which is similar to the findings of studies conducted among food handlers in Malaysia and India\textsuperscript{55,56}. Most of the respondents attained secondary level of education (54.5%), practiced Christianity (92.7%) which is consistent with what was obtained from a Ghanaian study\textsuperscript{57} and were Esan (57.1%) by tribe. Majority (92.1%) of respondents have never had any training on hand washing prior to this study. This is similar to the findings in studies done in Malaysia (88.5%), Thailand (79.3%) and Ethiopia (78.2%) \textsuperscript{41.39,57,59}. Without training, the knowledge base and safe practice of the vendors will be low making them to be a potential source of threat to food safety. This is buttressed by the view of Kalua, that knowledge positively influences attitude formation, and the recipient’s comprehension of health facts. Poor knowledge leads to misconception and development of negative attitudes. As a result, it increases harmful practice\textsuperscript{60}.

This study found no statistically significant association between socio-demographics and practice except for age (p<0.0001), religion (p=0.020) and ethnicity (0.0001). There was a relatively bimodal distribution of poor practice amongst the extremes of ages that participated in the study, age interval 20-29 (37.5%) and 40-49 (41.7%). This differs from the findings by Nee et al in Malaysia which found that mean KAP score consistently increased with age\textsuperscript{39}. However, some observational studies found that although the food handlers have good knowledge towards food safety but they do not always put the knowledge into practice\textsuperscript{62}. Manning and Snider reported that 81% of their respondents are aware of the importance of hand washing, but only 2% observe washing their hands thoroughly\textsuperscript{63}. All (100%) of those with good practice and most (62.4%) with fair practice belong to the age interval 30-39. Christians made up 79.2% of those with poor practice. However, 100% and 94.3% of those with good and fair practices respectively were also Christians. Ethnicity also showed a relatively bimodal distribution of poor practice, Esan 37.5% and Bini 41.7%. These may be a reflection of the age, religion and tribe distribution in the study population. The practice of proper hand washing was poor in this study as only few respondents consented to always practicing hand washing with soap and water, whereas in another study conducted elsewhere 60% of the respondents practiced proper hand washing with soap and water\textsuperscript{39}. Only 5.2% had good practice of hand washing which is similar to the study of Manny and Snider (1993) and 12.6% poor practice. This study also found that 93.2% of respondents would wash their hands if it is important to them, 90.6% if things for hand washing are available and 82.2% for their health and that of their customers. Thus, there is little or no desire to hands as appropriate. This is challenging and calls for more concerted efforts and tact to change this statistic. None of all the respondents is aware of the WHO recommendation on hand washing and none would wash because someone is watching or supervising. Also, our study found that 97.4% of respondents do not practice hand washing because they do forget 85.3% because it takes time, 77.5% because it is not convenient, and none refused to practice hand washing because he/she disagrees with WHO recommendations. This brings to the fore the need to intensify efforts at educating food vendors in developing countries to reduce their potential to be agents of disease transmission.

**Conclusion and Recommendations**

In this study, the food vendors interviewed are fairly aware of the concept of hand washing as a public health strategy for preventing food borne diseases. The application of this in actual practice is still a far cry from best practices. Factors that influenced this were educational status, ignorance of hand washing practices, lack of supervision, lack of reminders and misconceptions. Therefore, there is need to advocate for improvement.

It is recommended therefore, that structured hand washing training programme to ensure the delivery of wholesome food to the consumers, provision of hand washing posters to serve as reminders as well as periodic supervision of food handlers be organized by the environmental health unit of health department in the local government councils. Regular supervision by
environmental health officers is also recommended. This supervision would ensure that vendors have hand washing materials. The local government should make provision for potable water to facilitate hand washing practice and by extension protect the life of the populace.

Acknowledgement

The authors would like to express their gratitude to the food vendors who gave their full consent to participate in the study.

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Original Article

Association between Medical Doctors’ White Coats and Bacteria Dissemination in a Tertiary Hospital in Nigeria.

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Abstract

Aim: This study was carried out to assess the extent of transmission of bacterial pathogens through laboratory white coats of Medical Doctors in a tertiary hospital in Nigeria.

Methods: A multistage method was used to select respondents for the questionnaire survey and the cuffs of the sleeve as well as the mouths of the dominant pocket of their white coats were swabbed using moistened sterile swab stick. The swabs were transported to the laboratory in sterile bijou bottles containing Stuart’s transport medium to maintain the viability of the organism.

Results: Out of 103 white coats examined, 80(77.7%) were contaminated with 164 identified bacterial species. The most frequently isolated bacterial agents were Staphylococcus aureus (45.1%), Staphylococcus epidermidis (26.2%), and Klebsiella pneumonia (22.6%). The mouths of the dominant pocket have more isolates than the cuffs of the sleeves. Frequency of white coats usage in the hospital and manner of exchanging of white coats among health workers are the two factors that showed significant relationship between contaminated and uncontaminated white coats ($\chi^2=2.992$, $P<0.01$). Other factors such as age of white coat usage, number of white coat owned and frequency of washing white coats play significant role in determining the purity of the white coats.

Conclusion: This study demonstrates that health workers’ white coats harbour pathogenic bacteria. The mouths of the dominant pocket are more incriminated than the cuffs of the sleeves. These pathogenic bacteria are capable of transmitting hospital infections in admitted patients.

Keywords: White coats, Health workers, aerobic contaminant

Introduction

The white laboratory coat is commonly regarded as the attire that confers a sense of professionalism and authority within the health care industry, the white colour was later chosen as a symbol of purity and dedication to do no harm (Enoch, 2013). The white coats are one of the established symbols of the medical profession and are probably the items of clothing worn most by physicians (Kazory, 2008). The symbolism of these white coats is often recognized by formal ceremonies at which medical school graduates are granted the distinction of wearing one to emphasize the humanistic values of medicine (Branch, 1998; Harnett, 2001; Wear, 1998). There has been increasing concern, however, regarding the fact that white coats may play a vital role in transmitting pathogenic microorganisms in a hospital setting (Lohet al, 2000; Srinivasan et al, 2007; Treakle et al, 2009; Wilson et al, 2007; Wong et al, 1991). This concern is yet to be fully comprehended in most of the healthcare settings, especially in developing
countries where there is the need to influence control measures for those infections that are life threatening and patient safety initiatives in the training institutions.

Studies have shown that, healthcare workers may be potential reservoirs of disease, transmitting virulent microorganisms to their patients (Saloojee and Steenhoff, 2001). In a study conducted by Lohet al., (2000) in UK, students’ white coats were found to be more contaminated at points of frequent contact, such as the sleeves and the pockets. Most of the organisms identified in the study were principally skin commensals including Staphylococcus aureus. In a similar study carried out in Nigeria by Uneke and Ijeoma (2010), 91.3% of coats had bacterial contamination, specifically diphteroids, Staphylococcus aureus and Gram-negative bacilli were isolated.

Therefore, this study was designed to assess the extent by which wearing white coats by health workers could predispose to bacterial agent’s transmission with health care institutions.

Materials and Methods

Study population and sampling technique.
A total of 103 Medical doctors who participated were drawn from several medical specialities. The participants comprise of surgery (35), Medicine (29), Pediatrics (20) and Obstetrics and Gynecology (19). Approval from the hospital ethical committee was duly obtained. All the participants were given a brief, self-administered, structured questionnaire was used to collect demographic data and information on the possible factors that predispose white coats to contamination such as age of usage, frequency of washing, number of white coat possessed, and frequency of usage in the hospital and informed consent forms. Respondents were; House officers, Resident Doctors and Consultants.

Sampling Technique: Sample collection: Swabs were taken from two different sites on the white coat like mouth of the dominant pocket, and the cuffs of the sleeve. A plain sterile swab stick moistened in normal saline was used by rubbing the swabs up and down twice on the desired sites and the swabs were immediately placed inside bijou bottle containing Stuart’s transport medium and these were transported to the Medical Microbiology and Parasitology laboratory within 2 hours of collection. These swabs were then streaked on blood and McConkey’s agar plates incubated aerobically for 18 to 24hrs at 37°C.

Laboratory Analysis of Result: The plates were examined visually after 24 hrs. incubation at 37°C for morphological characteristics of the expected aerobic organisms, and these include colonial color, size, edge/margin, elevation, form, translucency, texture, and haemolysis.

Microscopic examination: The isolates were streaked onto a clean glass slides and gram stained according to the standard Gram staining procedure, based on this the isolates were classified into gram negative and positives (Cheesbrough, 2000).

Biochemical study: The isolates were further subjected to the following biochemical test to identify them to species level: Catalase, Coagulase, Oxidase, Indole production, Citrate utilization, VP and MR tests by following standard procedures as described by Cheesbrough, (2000).

Data analysis: The structured questionnaires were numbered, checked for errors and accuracy and pretested before used. Data collected were analyzed using SPSS version 20 statistical software. Categorical data were compared using chi-square($\chi^2$).

Results

Table 1 shows the isolated bacteria species from the examined Health workers white laboratory coats. A total of 164 bacterial species, which comprises of Staphylococcus aureus 74(45.1%), Staphylococcus epidermidis 43(26.2%) and Klebsiella pneumonia 37(22.6), Pseudomonas aeruginosa 6(3.7%) and Enterococcus faecalis 4(2.4%). The mouths of the dominant lower pockets were found to be heavily contaminated with a total of 91 (55.5%) isolates as against 73 (45.5%) isolates found on the cuffs of the sleeves (Table 2). Staphylococcus aureus was the predominant isolates at both sites.

Analysis of the questionnaires revealed that white coats of 80 out of 103 respondents who returned their questionnaires were contaminated the ($\chi^2$) test showed that there is a statistical significant difference between the frequency of white coats usage and white coats contamination($\chi^2$) =2.992, P<0.01 (table 3).
It was also discovered that there is a significant relationship between the manners of exchanging white coats among the respondents and white coats would be contamination. ($\chi^2$) =1.834, P<0.01 (table 4).

### Table 1: Bacteria; species isolated from white Coats of Doctors in a tertiary health care in Nigeria.

<table>
<thead>
<tr>
<th>Isolated Bacteria</th>
<th>No. of Isolates</th>
<th>% Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus</td>
<td>74</td>
<td>45.1</td>
</tr>
<tr>
<td>Staphylococcus epidermidis</td>
<td>43</td>
<td>26.2</td>
</tr>
<tr>
<td>Klebsiella pneumonia</td>
<td>37</td>
<td>22.6</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>6</td>
<td>3.7</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>4</td>
<td>2.4</td>
</tr>
</tbody>
</table>

### Table 2.0: Bacteria agents isolated from different sites of the doctors’ white coats in a tertiary health care institution in Nigeria.

<table>
<thead>
<tr>
<th>Bacterial Agents</th>
<th>Sleeves (%)</th>
<th>Pocket (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus</td>
<td>38 (46.3)</td>
<td>36 (39.6)</td>
<td>74 (45.1)</td>
</tr>
<tr>
<td>Staphylococcus epidermidis</td>
<td>19 (26.0)</td>
<td>24 (26.4)</td>
<td>43 (26.2)</td>
</tr>
<tr>
<td>Klebsiella pneumonia</td>
<td>13 (18.0)</td>
<td>24 (26.4)</td>
<td>37 (22.6)</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>3 (4.0)</td>
<td>3 (3.3)</td>
<td>6 (3.7)</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>4 (4.3)</td>
<td>4 (4.3)</td>
<td>8 (4.9)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>73</td>
<td>91</td>
<td>164</td>
</tr>
</tbody>
</table>

### Table 3.0: Ranking of bacteria isolates based on frequency of laboratory coats usage by the Doctors.

<table>
<thead>
<tr>
<th>Contamination</th>
<th>Frequency of use of the lab. coat in the hospital</th>
<th>Total use of lab. coats (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At all times</td>
<td>Only when seeing patients</td>
</tr>
<tr>
<td>Not contaminated Count</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td>Contaminated Count</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong> Count</td>
<td>75</td>
<td>28</td>
</tr>
</tbody>
</table>

($\chi^2$) =2.992, df=1, P=0.0067

### Discussion

White coats are used as means of preventing cross contamination between patients and their Doctors, but that role is being subjected to a review with several evidences which shows that the white coats harboured potential contaminants (Wong et al, 1991, Muhadi et al, 2007, Varghese and Partel, 1999, Neely, 2000 and Uneke and Ijeoma, 2010) and so these could have a role in the cross transmission of healthcare associated infectious pathogens.

In this study, out of 103 doctors’ white coats examined, 80 (77.7%) were contaminated. The degree of contamination is within the ranges of (23 to 95%) that have been previously reported by other researchers (Pilonetto et al, 2004; Srinivasan et al, 2007; Treakle et al, 2009; Wong et al, 1991).

*Staphylococcus aureus* was the most frequently isolated bacteria species. It was found on both the cuffs of the sleeve and mouth of the dominant pockets of all the examined doctors’ lab Coats. These findings are also in agreement with Muhadi, et al., (2007), Treakle et al., (2009) and Wong et al., (1991) but at variance with the findings of Uneke and Ijeoma, (2010), where diphtheroids were the most common organisms isolated.

The reason for higher percentage of *Staphylococcus aureus* on the cuffs of the sleeve than the mouth of the pocket as shown in this study may be associated with the fact that *Staphylococcus aureus* is a member of normal flora of the human anterior nares, nasopharynx, perineal area and skin (Betty et al, 2007). It can be spread easily...
by the hands, expelled from the respiratory tract or transmitted by animate or inanimate objects (Pelczar et al., 1993). The hands being one of the means through which the sleeve can be contaminated and the vehicle through which *Staphylococcus aureus* can be easily spread is likely found to be responsible for that. Also, being part of the skin commensal, the sleeve has the potential of picking it up from the patients’ skin and even the doctors’ skin than the pocket during healthcare delivery or while moving from ward to ward.

Of the two predetermined sites selected for examination on the white coats, the mouth of the dominant pockets was more contaminated than the cuffs of the sleeve.

The highest contamination level of the pocket was in contrast with the findings of Uneke and Ijeoma, 2010 which indicated that white coat-cuffs had a higher bacterial load than the mouth of the pockets but in concordance with the findings of (Neely, 2000; Loh, 2000) where the pockets were sites which had the highest percentage of bacteria. This level of contamination of the dominant pocket is because it is a site of frequent contact by the hands and the hands being capable of harboring bacteria contaminants during the process of healthcare delivery can then contaminate the pocket during contact thus it has a higher possibility of being colonized by bacteria. Normally doctors are of the habit of putting various inanimate objects such as stethoscopes (Uneke et al., 2009), neckties (Steinlechner et al., 2002) and pens (French et al., 1998) that have been shown to have potential of transmitting healthcare associated infectious pathogens into their pockets thereby contaminating it in the process. The sleeve on the other hand, has little means of contamination as compare to the mouth of the pocket. As the doctors examine patients, the sleeve of the coat, especially the cuffs, are the site that most frequently comes into contact with the patient or even external to aerosol deposition. Also, the transfer of bacteria from sleeves to hands and/or vice versa is inevitable.

The results of this study suggest that the rate of white-coat usage and handling practices form integral factors that predispose white coats to contamination. The way the white coat is used or handled by a physician can largely determine the level of its contamination as well as the rates of its harbouring and potentially transmitting pathogens irrespective of the length of time it has been in use or whether the owner has more than one. Wong et al. (1991) noted that the level of bacterial contamination did not vary with the length of time a coat had been in use, but increased with the degree of usage by the individual physician.

Going by the assertion made above, this study demonstrates that the white coats of physicians who used them only when seeing patients had significantly lower percentage of bacterial contamination than the coats of their counterparts who used theirs always. This is in consonant with the finding of the study by Uneke and Ijeoma, 2010. Therefore, the fact that there is significant relationship between the frequency of usage in the hospital and whether the coats would be contaminated shows that the possibility of contamination from other sources apart from patients is inevitable since the doctors use them beyond the expected limit. These contaminants can come from surfaces in the hospital of which the doctors come in contact with or even the hospital environments which are densely colonized by bacteria contaminants.

However, there is a statistical significant relationship between the manner of exchanging white coats and the level of contamination. Thus, the more the white coat is given out to or collected from others the more the rate of contamination. This is possible because of individual approach to handling and maintenance attitude. Also, the specialty of those collected from or given to could be a strong reason as frequency of seeing or having contact with patients varies from one specialty to others. The exact place visited by the collectors, either within or outside the hospital, also necessitated the degree of contamination.

**Conclusion**

This study demonstrates that doctor’ white coats harbours aerobic bacteria. Of the two sites screened on the white coats, the mouth of the pockets are much more contaminated than the sleeves. Frequency of white coat usage in the hospital and manner of exchanging white coat among doctors are the two factors that shows significant relationship with whether the white coats would be contaminated among other factors such as age of white coat usage, number of white coat possessed and frequency of washing white coat. Therefore, purposeful use of white coats in the hospital, eradication of collecting from or giving white coats to others and regular washing of the white coats should be given
priority to minimize the possibility of contamination thereby preventing spreading of these aerobic bacteria in the healthcare settings. Also, as contamination of the hands is highly likely to occur from organisms present on the cuff as well as the mouth of the dominant pocket during contact and vice versa, the normal scrupulous hand washing should be observed before and after attending to patients.

References

Diagnostic value of superficial cultures for late onset sepsis in preterm neonates.

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3Division of Microbiology, Queen Elizabeth University Hospital, NHS Greater Glasgow & Clyde.
4Neonatal intensive Care, University Hospital of North Tees, Stockton on Tees

Abstract

Background: Late onset sepsis is associated with poor outcome and one of the prevalent causes of death in preterm population; hence there is always a need for early prediction of sepsis. Performance of routine superficial swab culture is one of the strategies for early prediction and may help in selection of appropriate empirical antibiotics.

Objective: The purpose of the study is to evaluate the diagnostic value of superficial swab cultures for late onset sepsis.

Methods: We conducted a retrospective cohort study (November 2015 to October 2016) in a tertiary neonatal intensive care. Inclusion criteria were preterm infants with gestational age ≤34 weeks with a diagnosis of sepsis (culture positive and culture negative bacterial sepsis). In our unit, weekly surveillance swab cultures (skin swab, mouth swab, nasopharyngeal aspirate, umbilical surface swab) taken from all admitted neonates and usually no intervention are carried out based on these culture results. We excluded infants with surgical diagnosis/congenital anomalies and infants with early onset sepsis.

Results: One hundred and eleven neonates were eligible; after exclusion, there were 38 preterm infants fulfilling our inclusion criteria, among them there were 108 late onset sepsis episodes. Blood culture was positive in 33 episodes and Staphylococcus epidermidis (21%) was the most common organism cultured. In our study, superficial swab cultures had a very low diagnostic value, as sensitivity (42.9%), specificity (28.7%), predictive values and likelihood ratio all the estimation were low.

Conclusions: Superficial swab cultures are associated with low diagnostic value for late onset sepsis in preterm neonates.

Keywords: Sepsis, superficial culture, neonates.

Introduction

In a large UK based study, sepsis is one of the prevalent causes of death in preterm population. With advances of neonatal intensive care and improvement in respiratory care, there is a significant reduction in respiratory mortality, but there is no change in mortality due to sepsis1. Apart from increasing mortality, sepsis is also associated with adverse neurodevelopmental outcome2,3

With rapidity of progression of clinical picture, and associated poor outcome, there is always a need for early prediction and intervention of sepsis. Performance of routine superficial swab culture is one of the strategies for early prediction and may help in selection of appropriate empirical antibiotics. This is based on hypothesis that superficial colonization precedes invasive infection. The purpose of the study is to evaluate the diagnostic value of superficial cultures for neonatal sepsis.

Methods

We conducted a retrospective cohort study in a tertiary neonatal intensive care for a period of 1 year (November 2015 to October 2016). We used combined neonatal national database and microbiology database for identification of potential subjects. Inclusion criteria were preterm infants with gestational age...
≤34 weeks with a diagnosis of late onset sepsis [LOS] (>72 hours of birth); both culture positive bacterial sepsis and culture negative clinically suspected late onset sepsis [any episode of sepsis requiring blood culture]. We defined early onset sepsis with onset of sepsis within 3 days of life, and we excluded these infants, as it will reflect perinatal transmission. We excluded preterm infants with a surgical diagnosis and congenital anomalies, as these infants are higher baseline risk for sepsis. Superficial culture is defined as cultures taken from any surface (skin swab, throat/mouth swab, nasopharyngeal aspirate, nasogastric, umbilical surface swab, ear swab, endotracheal aspirate [intubated infants] and not from invasive sites (blood, urine, cerebro-spinal fluid, pleural, ascitic fluid). For the purpose of the study these swab cultures are classified as “Superficial swab cultures”. If the blood culture has more than one organism, then based on clinical discretion it was labeled as “contaminant” and excluded from the analysis. This project was started as audit and approval was obtained from the hospital audit committee.

Unit Practice: Our neonatal intensive care unit is a perinatal centre in the west of Scotland region with approximately 8000 deliveries every year. Approximately we have 600 intensive care admissions per year and the common diagnosis for admission are prematurity, sepsis, hypoglycemia, cardiac malformation and infants with surgical pathologies. Our unit is staffed by junior level trainees, senior trainees, neonatal nurse practitioners, neonatal nurses, neonatal midwives and consultant neonatologists. Weekly surveillance swab cultures are taken from all admitted neonates and usually no intervention is carried out based on these culture results.

Data Collection & Analysis

We collected the following data: demographics including sex, birth weight, gestational age, corrected gestational age at the sepsis episode, Blood culture organism, superficial swab culture results. We used descriptive statistics for population characteristics. Categorical variables will be presented as proportions, while numerical variables will be presented as mean (Standard Deviation) for normally distributed data or median (Inter-Quartile range) for skewed data as appropriate. Superficial swab cultures were taken on the week of sepsis episode (date of blood culture taken) were used for analysis. We calculated sensitivity, specificity, predictive value and likelihood ratio of superficial culture for late onset sepsis (R Commander Version 2.2-4). True positive (TP) is defined as both blood culture and superficial swab culture growing same organism. False positive (FP) is defined, when the superficial culture is positive with negative blood culture or when the organism is different from both cultures. False negative (FN) is when blood culture is positive and superficial culture is negative. True negative (TN) is when both cultures are negative.

Patient identifiers were removed from all data prior to analysis. We used STROBE checklist for observational studies for reporting.

Results

During the study period, we had a total of 1427 admissions, after exclusion of surgical diagnosis/congenital anomalies, term admissions and early onset sepsis there were a total 38 preterm infants (gestational age ≤ 34 weeks) with a diagnosis of LOS. Among these 38 infants, there were a total of 108 LOS episodes. Study demographics are shown in Table 1.

Table 1: Baseline characteristics of the Study Population (GA ≤ 34 weeks)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean gestational age at birth</td>
<td>29.5 weeks (±2.3)</td>
</tr>
<tr>
<td>Mean corrected gestational age</td>
<td>31.5 weeks (±3.3)</td>
</tr>
<tr>
<td>Mean Birth weight at birth</td>
<td>1124 grams (±162)</td>
</tr>
<tr>
<td>Male sex</td>
<td>18 (47.36%)</td>
</tr>
<tr>
<td>Blood culture positive</td>
<td>33 out of 108 late onset sepsis episode (30.5%)</td>
</tr>
</tbody>
</table>

*SD: Standard Deviation

Blood culture was positive in 33 episodes. Staphylococcus epidermidis (21%) is the most common organism cultured, followed by staphylococcus capitis (18%) and Coagulase negative staphylococci (15%). In our study superficial swab cultures had a very low diagnostic value, as sensitivity, specificity, predictive values and likelihood ratio all had lowestimation values (Table 2).
Table 2: Diagnostic value of superficial cultures

<table>
<thead>
<tr>
<th></th>
<th>Estimation</th>
<th>95% (Lower CI-Uppper CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>42.9%</td>
<td>21.8 – 66</td>
</tr>
<tr>
<td>Specificity</td>
<td>28.7%</td>
<td>19.5 - 39.4</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>12.7%</td>
<td>6.0 – 22.7</td>
</tr>
<tr>
<td>Diagnostic accuracy</td>
<td>0.31</td>
<td>0.23-0.41</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>67.6%</td>
<td>50.0 – 82</td>
</tr>
<tr>
<td>Likelihood ratio of a positive test</td>
<td>0.60</td>
<td>0.36 - 1.0</td>
</tr>
<tr>
<td>Likelihood ratio of a negative test</td>
<td>1.98</td>
<td>1.21- 3.26</td>
</tr>
</tbody>
</table>

In the true positive cases (n=9), swab cultures were obtained from endotracheal aspirate (n=4), Mouth/Throat swab (n=4), and gastric aspirate (n=1). In all these episodes vancomycin and gentamicin were used as the initial choice of antibiotics and the swab cultures didn’t influence the choice of antibiotics.

Discussion

Drawbacks of our study is its retrospective method, we did not include clinically presumed sepsis (based on clinical features, inflammatory markers). We didn’t perform molecular testing to verify whether organism isolated from swab and the blood cultures were of the same species. Another inherent problem with blood culture is the technique of blood sampling, volume of the blood and culturing method. Even with the best technique, blood cultures are positive only in certain percentage of neonates. In a large study of 99,796 VLBW infant with suspected LOS, blood cultures were positive only in 8.9% of the cases. New evidence is emerging regarding non-bacterial causes of sepsis. In a prospective study with 100 infants evaluated for LOS 8% had respiratory virus detected. In our study, it is possible that a percentage of sepsis episodes could be due to non-bacterial reasons.

Even though predictive values are dependent on the disease prevalence in a setting, sensitivity, specificity and likelihood ratios are independent of disease prevalence, should be applicable to other settings. The probability of superficial culture in diagnosing/ruling out late onset sepsis is extremely low as likelihood ratio of a positive test<1 and likelihood ratio of a negative test>1. Another measure of diagnostic effectiveness is “diagnostic accuracy”, expressed as proportion of correctly classified subjects (TP+TN) among the total number of subjects and it is dependent on the disease prevalence. In our study 34 (TP+TN) were correctly classified among 108 sepsis episodes providing a low diagnostic accuracy.

In a previous small study, superficial cultures had high sensitivity (74%), low specificity (38%) and low negative predictive value (47%). In this study, the prevalence of sepsis was high (46%) and they included all the cultures taken within the first 2 weeks. In a study assessing cost benefit analysis of superficial cultures, it was shown that cost of surface culture was high and only in 25% of the time did it influence a therapeutic decision. With poor diagnostic value and high cost involved with superficial swab cultures in diagnosing/predicting late onset sepsis, this practice is of very low cost benefit value. This might lead to inadvertent use of antibiotics just based on swab cultures.

Conclusion

Superficial swab cultures are associated with low sensitivity, predictive value and lower likelihood ratio and it did not influence the choice of antibiotics for late onset sepsis.

References


Haematological parameters of normal pregnant women during antenatal clinic booking in Ilorin, North Central Nigeria

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Abstract

Alterations in the values of some haematological parameters like packed cell volume and haemoglobin concentration during pregnancy have been reported to significantly influence pregnancy outcome. The aim of this study was to determine the values of haematological parameters in apparently healthy pregnant women during the antenatal clinic booking visit at the University of Ilorin Teaching Hospital, Ilorin, North central Nigeria.

A total of 298 apparently healthy pregnant women who presented for antenatal care booking and satisfied the inclusion criteria were included in the study. There were 64 (21.5%) women in first trimester, 146 (49.0%) women in second trimester and 88 (29.5%) in third trimester; and were aged between 22 and 42 years. Packed cell volume, haemoglobin concentration, Red cell count, mean haemoglobin concentration, mean corpuscular volume, mean corpuscular haemoglobin concentration, Total white blood cell count and differentials, Platelet count and erythrocyte sedimentation rate were carried out in the subjects.

The overall mean values and SD of the pregnant women for the haematological parameters were as follows: PCV (32.76±2.18%), Hb (10.82±0.77g/dl), RBC (3.87±2.32 x10¹²/L), MCH (28.08±2.06 pg), MCV (85.16±5.82 fl), MCHC (33.01±1.05 g/dl), TWBC (7.35±2.62 x10⁹/L), Platelet count (192.15±62.80 x10⁹/L) and ESR (34.07±16.85 mm/hr).

There were statistically significant differences in the mean values of PCV, MCH and MCV with increasing gestational age (p<0.05).

Conclusion: The present study provides a baseline data on the haematological values in pregnancy in the North central zone of the country on which further large scale studies in future may be based. This study will also be of immense benefit in the monitoring of pregnant women to determine those at risk for timely intervention thereby improving pregnancy outcome.

Keywords: Haematological, Parameters, Pregnant, Antenatal

Introduction

Pregnancy is a physiological state which is characterized by a variety of haematological changes that may appear pathological in the non-pregnant state1,2. Profound changes occur in almost every organ or body system during normal pregnancy to accommodate the increasing demand by the growing foetus2,3.

Pregnancy outcome is often influenced by several factors such as the socioeconomic status, environment, cultural beliefs and access to healthcare among others4,5.

Laboratory parameters during normal pregnancy have been reported to differ significantly from those of the non-pregnant state6 and alterations in the levels of haematological indices have been reported to have a major impact on pregnancy and its outcome1,6.

The plasma volume is said to increase by 30-45%, which results in a general haemodilution which had been termed “physiological anaemia” of pregnancy due to the apparently observed reduction in haematocrit of normal pregnant women. These progressive physiological changes that occur are necessary to support and protect the growing foetus and prepare the mother for parturition2,7,8.
Assessment of the haematological indices has been used in pregnant women worldwide to estimate their general health status and monitor or predict pregnancy outcome. This is because it is believed to be a reliable indicator of health which is simple, fast and cost effective.

During normal pregnancy, haemoglobin concentration is the most common haematological parameter that is assessed. Anaemia or reduced haemoglobin concentration has been widely reported as a major haematological abnormality which could adversely affect pregnancy outcome. Anaemia in pregnancy has been defined as either haemoglobin concentration lower than 11.0g/dl, or haemoglobin concentration which is less than the 5th percentile of the haemoglobin distribution in a healthy reference population, and it has been reported by several authors to be a major contributor to low birth weight, miscarriages and high maternal mortality.

The haematological parameters that had been used to monitor the general health of pregnant women include: Packed cell volume (PCV) or haematocrit, haemoglobin concentration (Hb), Red blood cell count (RBC), mean corpuscular haemoglobin (MCH), Mean corpuscular volume (MCV), Mean corpuscular haemoglobin concentration(MCHC), Total white blood cell count(TWBC) and differentials, platelet count and Erythrocyte sedimentation rate(ESR). The haematological parameters may be affected by factors including age, diet, medications, environmental influences as well as ethnic and tribal peculiarities. They are also useful in risk assessment of pregnant women, and the booking visit provides an opportunity for their evaluation so as to predict and monitor pregnancy outcome or in establishing a reference range for the parameters.

Most haematological reference values which had been reported for normal pregnant women were based on Caucasian populations with a few studies from African countries, Nigeria inclusive. In Nigeria, the studies that reported on haematological parameters in pregnancy were mainly from the south western and south eastern part of the country and none from the north central part of Nigeria.

This study therefore aims to determine the haematological parameters in apparently healthy pregnant women during the booking visit for antenatal care at the University of Ilorin Teaching Hospital (U.I.T.H) Ilorin, north central Nigeria, and compare with previous reports from within and outside Nigeria, and it also intends to provide a baseline data for a larger study that will establish a reference range for the haematological parameters in the Northern part of the country which may help to identify at risk pregnant patients that would require prompt intervention thereby improving pregnancy outcome.

Materials and Method

This was a cross-sectional study that was carried out at both the Antenatal Clinic and the Department of Haematology and Blood transfusion of the University of Ilorin Teaching Hospital, Ilorin, Nigeria between September and November 2012. The University of Ilorin Teaching Hospital (U.I.T.H.) serves the population of Ilorin metropolis and the surrounding towns and villages. It also serves as a referral centre for primary and secondary healthcare facilities in the neighbouring states (Oyo, Osun, Ekiti, Ondo and Niger) of Nigeria. Ilorin, the capital city of Kwara state, Nigeria is located in the North Central geopolitical zone, an area of stable malaria transmission all year round.

Using the serial recruitment method, all consecutive apparently healthy pregnant women who presented for booking at the Antenatal clinic of the U.I.T.H., Ilorin, and consented to the study were enlisted during the study period. A pretested structured questionnaire was administered on each subject prior to venous blood sampling for the haematological tests. The socio-demographic data (name, age, educational status, parity etc.), history of fever and or treatment for any febrile illness within the last two weeks of presentation were recorded. The pregnant women with fever (body temperature ≥37°C) at presentation, those that were receiving treatment or had received treatment for a febrile illness within two weeks of presentation, and those with underlying medical conditions such as hypertension (BP≥140/90 mmHg), diabetes, sickle cell disorders (Hb SS, SC and CC), bleeding disorders, Hepatitis B virus (HBV) and Human immunodeficiency virus (HIV) infections etc. were excluded from the study. Ethical approval for the research was sought and obtained from the Ethical Review Committee (ERC) of the U.I.T.H., Ilorin.
The height, weight and vital signs of the participants were also measured in addition to complete medical and obstetric examinations.

Five milliliters (5ml) of venous blood sample was collected from each participant by a trained phlebotomist during booking and dispensed into vacutainer specimen bottles containing K+ ethylene diamine tetra-acetic acid (EDTA) as anticoagulant by venepuncture using aseptic techniques. The blood samples were transported to the laboratory and analyzed within two hours of collection. The following parameters – PCV, Hb, RBC, MCH, MCV, MCHC, TWBC with differentials and Platelet counts were determined using the Sysmex KX-21 N Automated cell counter (Sysmex Corporation, Kobe, Japan). Standardization, instrument calibration and sample processing were carried out according to the manufacturer’s instructions17. Erythrocyte sedimentation rate was determined using the Westergreen method as described by Dacie and Lewis 18.

The data obtained were entered into a Microsoft Excel data sheet. Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) software version 11. Association between variables was tested using the Chi-square test for discrete variables and the Student t-test for continuous variables. Analysis of variance (ANOVA) test was used to compare the means of haematological parameters, and the level of statistical significance of data was taken as P value equal to or less than 0.05 (p ≤ 0.05).

Results

A total number of 298 apparently healthy pregnant women at various stages of pregnancy who satisfied the inclusion criteria and gave their consent for the study were recruited over the 3-month period. There were 64 (21.5%) women in the first trimester, 146 (49.0%) women in the second trimester and 88 (29.5%) women were in the third trimester. The age distribution of the 298 pregnant women in the study, and their other socio-demographic characteristics are shown in Table 1.

The overall mean values for the various haematological parameters assessed in the study population were: PCV (32.76±2.18%), Hb Conc. (10.82±0.77g/dl), RBC (3.87 ±2.32x10¹²/L), MCH (28.08±2.06pg), MCV (85.16±5.82fl), MCHC (33.01±1.05g/dl), WBC (7.35±2.62x10⁹/L), Platelet (192.15±62.80x10⁹/L), and ESR (34.07±16.85mm/hr) – Table 2.

Table 1: Showing the Socio-demographic variables of the pregnant women studied

<table>
<thead>
<tr>
<th>Variables</th>
<th>N= 298</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age (years)</td>
<td>Frequency (%)</td>
</tr>
<tr>
<td>18-22</td>
<td>23 (7.7)</td>
</tr>
<tr>
<td>23-27</td>
<td>44 (14.8)</td>
</tr>
<tr>
<td>28-32</td>
<td>144 (48.3)</td>
</tr>
<tr>
<td>33-37</td>
<td>70 (23.5)</td>
</tr>
<tr>
<td>38-42</td>
<td>17(5.7)</td>
</tr>
<tr>
<td>2. Parity</td>
<td></td>
</tr>
<tr>
<td>Nulliparous</td>
<td>60(20.1)</td>
</tr>
<tr>
<td>Para 1</td>
<td>196(66.8)</td>
</tr>
<tr>
<td>Para 2</td>
<td>32(10.7)</td>
</tr>
<tr>
<td>≥Para 3</td>
<td>10(3.4)</td>
</tr>
<tr>
<td>3. Level of Education</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>19(6.4)</td>
</tr>
<tr>
<td>Primary</td>
<td>42(14.1)</td>
</tr>
<tr>
<td>Secondary</td>
<td>115(38.6)</td>
</tr>
<tr>
<td>Tertiary</td>
<td>122(40.9)</td>
</tr>
<tr>
<td>4. Occupation</td>
<td></td>
</tr>
<tr>
<td>Civil Servant</td>
<td>148(49.7)</td>
</tr>
<tr>
<td>Housewife</td>
<td>56(18.8)</td>
</tr>
<tr>
<td>Self Employed</td>
<td>40(13.4)</td>
</tr>
<tr>
<td>Petty Trading</td>
<td>54(18.1)</td>
</tr>
<tr>
<td>5. Tribe</td>
<td></td>
</tr>
<tr>
<td>Yoruba</td>
<td>210(70.5)</td>
</tr>
<tr>
<td>Hausa</td>
<td>20(6.7)</td>
</tr>
<tr>
<td>Igbo</td>
<td>42(14.1)</td>
</tr>
<tr>
<td>Others</td>
<td>26(8.7)</td>
</tr>
<tr>
<td>6. Religion</td>
<td></td>
</tr>
<tr>
<td>Islam</td>
<td>162(54.4)</td>
</tr>
<tr>
<td>Christianity</td>
<td>136(45.6)</td>
</tr>
<tr>
<td>Others</td>
<td>0(0.0)</td>
</tr>
<tr>
<td>7. Marital Status</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>48(16.1)</td>
</tr>
<tr>
<td>Married</td>
<td>250(83.9)</td>
</tr>
<tr>
<td>8. Gestational Age</td>
<td></td>
</tr>
<tr>
<td>First Trimester</td>
<td>64(21.5)</td>
</tr>
<tr>
<td>Second Trimester</td>
<td>146(49.0)</td>
</tr>
<tr>
<td>Third Trimester</td>
<td>88(29.5)</td>
</tr>
</tbody>
</table>

When the pregnant women were grouped according to their gestational age, the mean values of the various haematological parameters in the first, second and third trimesters in them are shown in Table 3. The mean values for PCV, MCH and MCV were found to show statistically significant relationship with increasing gestational age (p= 0.032, p=0.022 and p= 0.005 respectively). There were no statistically significant relationships observed between the mean values of Hb
concentration, RBC, MCHC, TWBC, ESR and platelet counts and increasing gestational age Table 3).

Table 2: Mean values of Haematological parameters in the pregnant women studied (n=298)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean±SD</th>
<th>Reference Values*</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCV %</td>
<td>32.76±2.18</td>
<td>38.0 – 48.0</td>
</tr>
<tr>
<td>Hb. Conc g/dl</td>
<td>10.82±0.77</td>
<td>11.5 – 16.5</td>
</tr>
<tr>
<td>RBC x10¹²/L</td>
<td>3.87±0.32</td>
<td>3.8 – 5.8</td>
</tr>
<tr>
<td>MCH pg</td>
<td>28.08±2.06</td>
<td>27.0 – 32.0</td>
</tr>
<tr>
<td>MCV fl</td>
<td>85.16±5.82</td>
<td>76.0 – 96.0</td>
</tr>
<tr>
<td>MCHC g/dl</td>
<td>33.01±1.05</td>
<td>32.0 – 36.0</td>
</tr>
<tr>
<td>TWBC x10⁹/L</td>
<td>7.35±2.62</td>
<td>4.0 – 10.0</td>
</tr>
<tr>
<td>Neutrophils %</td>
<td>55.25±7.35</td>
<td>40.0 – 80.0</td>
</tr>
<tr>
<td>Eosinophils %</td>
<td>11.40±3.80</td>
<td>1.0 – 6.0</td>
</tr>
<tr>
<td>Basophils %</td>
<td>1.15±0.25</td>
<td>&lt;1.0 – 2.0</td>
</tr>
<tr>
<td>Monocytes %</td>
<td>1.38±0.17</td>
<td>2.0 – 10.0</td>
</tr>
<tr>
<td>Lymphocytes %</td>
<td>35.67±5.35</td>
<td>20.0 – 40.0</td>
</tr>
<tr>
<td>Platelet x10⁹/L</td>
<td>192.15±62.80</td>
<td>100.0 – 400.0</td>
</tr>
<tr>
<td>ESR mm/hr</td>
<td>34.07±16.85</td>
<td>0.0 – 15.0</td>
</tr>
</tbody>
</table>

*Reference Values from Dacie and Lewis Practical Haematology

Table 3: Haematological parameters of the pregnant women studied over the three trimesters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>1st Trimester</th>
<th>2nd Trimester</th>
<th>3rd Trimester</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCV %</td>
<td>31.54±3.35</td>
<td>29.88±3.24</td>
<td>30.84±3.08</td>
<td>0.032*</td>
</tr>
<tr>
<td>Hb. Conc g/dl</td>
<td>10.79±1.56</td>
<td>10.44±1.80</td>
<td>10.63±1.68</td>
<td>0.093</td>
</tr>
<tr>
<td>RBC x10¹²/L</td>
<td>3.99±1.15</td>
<td>4.18±2.06</td>
<td>4.22±1.92</td>
<td>0.187</td>
</tr>
<tr>
<td>MCH pg</td>
<td>27.68±2.95</td>
<td>28.86±2.99</td>
<td>28.58±3.02</td>
<td>0.022*</td>
</tr>
<tr>
<td>MCV fl</td>
<td>77.58±6.72</td>
<td>83.63±7.15</td>
<td>84.32±7.88</td>
<td>0.005*</td>
</tr>
<tr>
<td>MCHC g/dl</td>
<td>33.87±1.85</td>
<td>34.13±1.93</td>
<td>34.05±1.32</td>
<td>1.553</td>
</tr>
<tr>
<td>TWBC 10⁹/L</td>
<td>6.96±3.35</td>
<td>7.85±3.33</td>
<td>7.99±3.64</td>
<td>0.152</td>
</tr>
<tr>
<td>Neutrophils %</td>
<td>56.05±8.14</td>
<td>50.69±13.83</td>
<td>55.36±12.45</td>
<td>0.265</td>
</tr>
<tr>
<td>Basophils %</td>
<td>1.07±0.51</td>
<td>0.98±0.10</td>
<td>1.05±0.15</td>
<td>0.160</td>
</tr>
<tr>
<td>Monocytes %</td>
<td>1.36±0.58</td>
<td>1.28±0.67</td>
<td>1.40±0.25</td>
<td>0.346</td>
</tr>
<tr>
<td>Lymphocytes %</td>
<td>35.12±8.44</td>
<td>36.66±10.22</td>
<td>34.95±13.35</td>
<td>0.822</td>
</tr>
<tr>
<td>Platelet x10⁹/L</td>
<td>188.19±68.05</td>
<td>192.65±73.55</td>
<td>188.43±72.26</td>
<td>0.078</td>
</tr>
<tr>
<td>ESR mm/hr</td>
<td>33.68±18.63</td>
<td>35.08±17.24</td>
<td>34.89±16.78</td>
<td>0.088</td>
</tr>
</tbody>
</table>

*Statistically significant (p value <0.05)

Discussion

Many changes are known to occur during pregnancy which are meant to compensate for the increased demand of the foeto-placental unit and laboratory monitoring of the haematological indices in pregnant women have been reported by several authors to influence or predict outcome of pregnancy. In the present study, it was observed that parameters of pregnant women such as PCV (haematocrit) and Hb concentration were lower than normal. This observation agrees with the previous studies that were carried out within Nigeria and in other parts of the world. Osonuga IO et al in their study of pregnant women in south western Nigeria reported no significant change in PCV values across the three trimesters. This result contrasts with the finding in our study where a statistically significant reduction in PCV values was recorded across the different trimesters. The little differences which were observed between our study and the other studies may be related to genetic variations, ethnic and racial differences, climate and other environmental factors. Also, the reduction in the PCV may be explained by the general increase in plasma volume and haemodilution which occurs in pregnancy.

The mean MCV value in this study was found to be lowest in the first trimester, but increased during the second and third trimesters. The pattern observed with the MCV values agrees with the work of James TR et al which reported similar finding in Jamaican primigravid women during the first antenatal visit in West Indies. The increase in MCV during pregnancy has been attributed to increased red blood cell volume which becomes noticeable in the second trimester and this may suggest a compensatory mechanism for the haemodilutional anaemia which occurs in pregnancy. This “physiological anaemia” of pregnancy is demonstrable by the low Hb and haematocrit levels in the pregnant women when compared with their non-pregnant counterparts.

The mean corpuscular haemoglobin (MCH) is a measure of the haemoglobin concentration within the red blood cells. In this study, mean MCH value was found to have increased from the first trimester through the second and third trimesters. Similar observation was reported by other studies. The pattern observed with MCH values in this study and the other studies possibly corroborates the explanation for the MCV increase in pregnancy. The low levels of
haematocrit and Hb concentration which was found in the subjects may have been compensated for by the increased MCV and MCH resulting from increased individual red blood cell volume and haemoglobin concentration such that the haemodilutional anaemia does not adversely affect the pregnant mother in the absence of any other pathology.

The white blood cells (neutrophils, eosinophils, basophils and lymphocytes) are mainly involved in the defense of the body against invading microorganisms. This study revealed that WBC value was lowest in the first trimester but increased in the second and third trimesters, although, the change was not statistically significant (p = 0.152). This observation was similar to the findings of Ichipí-Ifúkor PC et al 4 which also did not observe any statistically significant change in the WBC values of the pregnant women studied across the three trimesters. Pughikumo OC et al 21 in Port Harcourt, however, reported statistically significant increase in the leucocyte counts of pregnant women with increasing gestational age.

Similar to the findings of Akingbola TS et al13 in Ibadan, South west Nigeria and Akinbami AA et al9 in Lagos, Nigeria, we observed a gradual decrease in the platelet counts of the pregnant women from the first trimester through the second to the third trimester in our study. Following the haemodilution and plasma volume expansion which occur during pregnancy, the platelet counts may decrease by approximately 10% especially during the second and third trimesters 2,7,22, but the absolute platelet counts remain within the normal reference values.

Erythrocyte sedimentation rate (ESR), although a non-specific test, is a reliable measurement of acute phase response to inflammation or treatment. In this study, ESR was found to be lowest in the first trimester and then increased in the second and third trimesters. Increased ESR values during pregnancy were also reported by Osonuga IO et al 10 and Dapper DV et al 14 in their studies. Pregnancy is a hypercoagulable state which is associated with an increased circulating fibrinogen and immunoglobulin levels. Therefore, the observed increase in ESR values during the second and third trimesters in this study may be due to increased level of fibrinogen or other proteins which had been reported to be increased during pregnancy 24. The mean values of the various haematological parameters studied among the apparently healthy pregnant women that presented for antenatal care at the U.I.T.H, Ilorin during the study period have been shown to be comparable with the findings of other researchers within and outside Nigeria.

**Conclusion**

It can be reasonably concluded that pregnancy brings about considerable alterations in some of the haematological parameters especially PCV, Hb concentration, MCH and MCV. Therefore, routine measurement of these parameters in pregnant women during antenatal care booking visit, even when they show apparent physical wellness, may help in the early detection of those at risk and prompt intervention will be of immense benefit and certainly contribute to better pregnancy outcome. This study in addition, will serve to provide additional baseline data for haematological parameters in healthy Nigerian pregnant women, especially in the North central zone of the country where there is paucity of data in this regard.

**References**

Histopathologic Patterns of Thyroid Lesions in Benin City, Nigeria.

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Abstract

Background: Aim: The aim of this study was to review the histopathologic types of thyroid lesions as seen at the University of Benin Teaching Hospital, Benin City over a twenty-year period.

Methods: All surgical thyroid gland specimens received in the Department of Histopathology, U.B.T.H and processed into formalin fixed paraffin embedded blocks, and H&E stained slides, within a 20-year period from January 1989 to December 2008 were reviewed. The collected data was analyzed using the SPSS version 16.0.

Results: Thyroid gland specimens made up 1.6% (394 cases out of 24,520) of all specimens received in the department in the 20-year study period. The age range was 1-80 years with a mean age of 38.4 ± 12.5 years and a female to male ratio of 8.6:1. Nodular goitre was the single commonest lesion followed by diffuse nontoxic goitre and follicular adenoma in that order, with the three lesions accounting for 289 cases (77.1%) of all thyroid disorders. Non-neoplastic lesions comprised 269 cases (71.7%) of all the 375 cases seen, while 106 cases (28.3%) were neoplasms.

Conclusion: This study shows that the histological types as well as age and sex incidences of surgical thyroid disorders do not differ significantly from earlier reports in Africa. Nodular goitre was the commonest lesion in this study. However, the observation of papillary carcinoma as the predominant malignancy in this study is at variance with most previous studies done in Nigeria where follicular carcinoma was commonly recorded as the dominant malignant lesion.

Key words: Thyroid, Lesions, Histology, Goitre

Introduction

Diseases of the thyroid predominantly manifest as enlargement of the gland and patients often seek medical attention for social and cosmetic reasons. By far the most common cause of thyroid enlargement is iodine deficiency ("goitre"). In 1997, the World Health Organization estimated that over half of the iodine deficiency disorder cases live in iodine deficient regions that include the eight most populous countries of the world, including Nigeria, with significant proportions of the population presenting clinically with goitre.1 The endemic goitre belts in Nigeria comprise the Benue-Plateau region, northern half of South-Western Nigeria including Ijesha, Ekiti and Ijebu areas, and theNsukka axis, Ogoja and Obudu areas in Eastern Nigeria.2-7

Other causes of thyroid enlargement are the relatively rare congenital abnormalities and acquired surgical diseases that consists of inflammatory lesions and neoplastic lesions. The inflammatory lesions are entities such as acute thyroiditis, granulomatous thyroiditis, lymphocytic thyroiditis, Hashimoto’s thyroiditis and Riedel’s thyroiditis.8,9

Thyroid neoplasms are classified into adenomas and malignant tumours which may be primary or secondary. The primary tumours are papillary carcinoma, follicular carcinoma, poorly differentiated...
carcinoma, squamous cell carcinoma, undifferentiated carcinoma, medullary carcinoma, lymphoma and sarcoma. The incidence of the different thyroid carcinomas vary according to certain prevalent factors. For example, there is an increase in the incidence of follicular carcinomas and, to a lesser extent, anaplastic carcinomas in areas endemic for iodine deficiency. Exposure to irradiation however, has been associated with increase in the incidence of papillary carcinoma. Malignant thyroid neoplasms are not uncommon and frequently affect middle aged women and have been estimated to be the thirteenth most common malignancy in some parts of Nigeria.

Thyroid specimens constitute a substantial proportion of surgical specimens received in histopathology laboratories. In ObafemiAwolowo University Teaching Hospital (O.A.U.T.H.), Ile-Ife and Lagos University Teaching Hospital (L.U.T.H.), Lagos, values of 2% and 2.2% were reported respectively. However, in Jos, a Nigerian mountainous area, a higher value of 3.4% was obtained which is comparable to a figure of 3.6% recorded in Addis Ababa, Ethiopia, an area with a similar topography.

There have been several studies on the histopathologic review of thyroid disease in Nigeria, most of which are from Southwest, North and Southeastern parts of the country. In South-south Nigeria, particularly in the Mid-western region, there is a dearth of information on thyroid diseases. The University of Benin Teaching Hospital (U.B.T.H) is strategically situated in this zone and serves as the pre-eminent tertiary centre in this region. Significantly, cassava, the main staple food of the people in this region is now known to be goitrogenic. Hence the justification for this project which we hope will provide baseline data for further research on this important subject in the sub-region.

Materials and Methods

Data of all surgical thyroid gland specimens received in the Department of Histopathology, U.B.T.H., Benin City within a 20-year period from January 1989 to December 2008 constitutes the materials for the study. These specimens were received predominantly from the General Surgery Department of U.B.T.H.

Demographic data regarding age and sex were obtained from the department’s surgical pathology register, duplicate copies of histological reports and the original pathology request cards.

The original histological slides were retrieved from the departmental archives. Where the slides are missing, tissue blocks in archives were recovered and new slides prepared and stained with haematoxylin and eosin (H&E) stain. For neoplastic lesions, reticulin stain was used to demonstrate the presence of vascular or capsular invasion by tumour cells; this was aimed at distinguishing a well-differentiated follicular carcinoma from follicular adenoma. Congo red was also employed to demonstrate the presence of amyloid in the stroma of medullary carcinoma.

The slides were reviewed and the lesions grouped according to the WHO Histological Classification of Thyroid tumours. The collected data was analysed using the SPSS version 16.0.

Result

General findings

During the 20-year (1989-2008) period of study, 24,520 specimens were received in the Pathology Department of UBTH. Thyroid gland specimens made up 1.6% (394 cases) of these cases. Nineteen of the 394 thyroid specimens were however excluded from the study due to incomplete biodata, loss of slides and tissue blocks, or both.

Table 1 shows the frequency, age and sex distribution of the various types of thyroid lesions encountered in this study while table 2 shows the age group distribution of these disorders.

The patients’ ages ranged from 1-80 years, and many of the lesions occurred in the 4th decade (30-39 years) with a mean age of 38.4 ± 12.5 years. Females were predominantly affected, with 336 (89.6%) occurring in females while 39 cases (10.4%) occurred in males, giving a female-male ratio of 8.6:1.

Figure 1 shows the frequencies of the various histological types of thyroid lesions seen in this study. Nodular goitre was the single most common lesion comprising 130 cases making up 48.3% of the non-neoplastic thyroid lesions. This is followed by diffuse nontoxic goitre and follicular adenoma in that order. All three lesions together accounted for 289 cases (77.1%) of all thyroid disorders.

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Figure 2 and table 1 shows that of the 375 cases of thyroid lesions included in the study, non-neoplastic lesions comprised 269 cases (71.7%) while 106 cases (28.3%) were neoplasms, giving a ratio of non-neoplastic to neoplastic lesions of 2.3:1. The peak age range for non-neoplastic lesions was 30-39 years and the female-male ratio was 10.7:1.

Congenital diseases of the thyroid gland accounted for 21 cases (5.6%). This comprised 19 cases (90.5%) of thyroglossal duct cyst and 2 cases (9.5%) of branchial cleft cyst (Table 1).

**Inflammatory thyroid lesions**
Inflammatory thyroid lesions accounted for 19 cases (5.0%) with ages ranging from 20 to 61 years. These lesions occurred predominantly in the 5th decade with a mean age of 39.1 ± 19.9 years. These lesions consist of 11 cases of Hashimoto’s thyroiditis (2.9%), 2 cases of granulomatous thyroiditis (0.5%) and 6 cases of lymphocytic thyroiditis (1.6%).

**Thyroid hyperplasias**
There were 229 cases of hyperplastic thyroid lesions constituting 85.1% of non-neoplastic lesions and 61.1% of all lesions (Table 1). Of these, 216 (94.3%) occurred in females giving a female-male ratio of 16.6:1. Ages of patients ranged from 12 to 80 years with a mean of 40.1±11.1 and a peak of 30 to 39 years. These lesions consist of 130 cases of nodular goitre (34.7%) with 123 cases in females and 7 cases in males (Table 1), giving a female-male ratio of 13.3:1. There were 86 cases of diffuse nontoxic goitre (22.9%). 80 cases were in females while 6 cases were in males, giving a female to male ratio of 13.3-1 (Table 1).

Graves disease was seen in 13 cases, constituting 3.5% of all thyroid lesions and all 13 cases were in females.

**Neoplastic lesions**
Thyroid neoplasms constituted 106 cases (28.3%) of all lesions comprising 90 females and 16 males giving a female to male ratio of 5.6:1. Of these, 74 cases (69.8%) were benign lesions while the remaining 32 cases (30.2%) were malignant, hence, the ratio of benign to malignant thyroid lesions ratio was 2.3:1. Of the 74 cases of benign thyroid neoplasm, 68 (91.9%) were in females while 6 (8.1%), were in males, giving a female to male ratio of 11.3:1. However, of the 32 cases of malignant thyroid neoplasms, females comprised 22 (68.8%) while the remaining 10 (31.2%) were males, giving a female to male ratio of 2.2:1. Therefore, there was a significantly greater proportion of male patients with malignant thyroid neoplasms in comparison to that of female patients ($x^2 = 45.11$, df = 4, p = 0).

The peak age incidence of the neoplastic thyroid lesions was 30-39 years (Table 2). There are 73 cases of follicular adenoma accounting for 98.6% of the
benign neoplasms, 68.9% of all thyroid neoplasms and 19.5% of thyroid lesions seen in this study. The only other benign neoplastic lesion seen was a single case of hurthle cell adenoma.

Papillary carcinoma was seen in 14 cases making it the most common malignant thyroid neoplasm. It accounts for 43.7% of malignant thyroid neoplasms, 13.2% of all neoplasms and 3.7% of all thyroid lesions. The peak age incidence was 30-39 years and the female-male ratio was 6:1. The mean age of patients with papillary carcinoma was 31.0 ± 8.9 years with an age range of 18 to 46 years.

There are 11 cases of follicular carcinoma, consisting of 34.4% of malignant thyroid neoplasms, 10.4% of all thyroid neoplasms and 2.9% of all thyroid lesions. The peak age incidence was 50-59 years.

Four cases of undifferentiated carcinoma were seen in this study, constituting 12.5% of malignant thyroid neoplasms, 3.8% of neoplastic thyroid lesions and 1.1% of all thyroid lesions.

Medullary carcinoma accounted for 0.8% (3 cases) of all thyroid lesions, 2.8% of all thyroid neoplasms and 9.4% of the malignant thyroid neoplasms. The female-male ratio was 1:2 and the peak age of occurrence was between 30-39 years.

Discussion

In this study, 1.6% of all the specimens sent to our department were from the thyroid gland. This frequency is only slightly lower than values available in some of the literature reviewed. In studies done in Enugu, Lagos and Ile-Ife, frequencies of 1.8%, 2.0% and 2.2% were reported respectively. However, studies done in mountainous areas such as Jos in Nigeria and Addis Ababa in Ethiopia recorded much higher frequencies of 3.4% and 3.6% respectively. However, in Enugu a very high value of 13.9:1 was recorded. The lowest value in all the series reviewed was 6:1. This was documented in separate studies in Ile-Ife, Nigeria and Sheffield in the United Kingdom. The peak age incidence of 30-39 years was also in agreement with most of the Nigerian studies with available data. In Enugu however, a higher value of 41-50 years was recorded.

Goitre (nodular and diffuse nontoxic) was the commonest surgical thyroid lesion seen in the department; it consists of 57.6% of all thyroid specimens and 80.3% of non-neoplastic thyroid lesions. Most previous studies on thyroid diseases report goitre as the commonest thyroid disorder, although with varying frequencies. A frequency of 54.8% which was slightly lower than ours was reported in Enugu while in Ibadan a much higher value of 84.5% was recorded. The female predominance (female-male ratio = 15.5:1) and peak age incidence of 30-39 years in this study is also in conformity with those done in Lagos and Ile-Ife. Graves disease, the only other hyperplastic thyroid lesion seen in this study accounted for 3.5% of all thyroid lesions. All cases occurred in females with a peak age incidence of 20-29 years. This low frequency of occurrence strongly concurs with earlier series in Nigeria such as the studies done in Enugu and Ilorin in which they recorded 2.4% and 5.7% respectively. However, in Kenya, two separate studies recorded much higher frequencies of 10% and 13% respectively. These series however, demonstrated a female predominance.

This study lends support to the relative rarity of congenital thyroid disorders with only 21 cases (5.6%) seen. The frequencies in Ilorin and Ile-Ife, Nigeria and in Kenya were 4.7%, 6.9% and 1% respectively. Nineteen of the 21 cases of the congenital disorder were thyroglossal duct cyst which also agrees with the earlier studies (12 of 13 cases in Ile-Ife, and all in Ilorin and Kenya) Our study show that inflammatory thyroid disease is uncommon, although the frequency of 5% recorded is high compared to those of earlier studies in Africa. An extremely low value of 0.7% was recorded by Olurin et al in Ibadan while Gitau in Kenya reported 1%. Hashimoto’s thyroiditis is the commonest thyroiditis in this study, accounting for 58% of inflammatory thyroid lesions. This concurs with studies done in Lagos (40%) and Ile-Ife (60%) but at variance with that of Addis Ababa in Ethiopia which reported Hashimoto’s thyroiditis (25%) to be the second commonest and nonspecific thyroiditis (31.3%) as the commonest.4,13,14,16,25
Neoplastic lesions are well represented in this study with an observed frequency of 28.3% of all thyroid lesions. Except for the study done by Anidi in Enugu which recorded a higher value of 44.9%, most of the studies in Nigeria reported relatively lower values of 15% in Ilorin, 15.6% and 17% in different studies in Lagos, 16.8% in Ile-Ife and 18.7% in Kano.13, 18, 19, 20, 24, 25 A frequency of 21% was documented in Ethiopia while a very low value of 8% was observed by Young and Meachim in Sheffield.16, 23

Some of the earlier studies in Nigeria and other parts of Africa have shown benign thyroid neoplasms to be more frequent than malignant thyroid neoplasms but to varying degrees. Similar studies in Lagos, Enugu and Kenya reported benign to malignant ratios of 1.7:1, 4.4:1 and 4:1 respectively.18, 21, 24 This study is in concordance, with a ratio of benign to malignant of 2.3:1. On the contrary, in some other studies such as the ones done in Ile-Ife, Ilorin and Kano, more malignant lesions were seen with benign to malignant ratios of 1:1.9, 1:1.2 and 1:2.5 respectively.13, 19, 20 In Sheffield an extremely tilted ratio of 1:15 was recorded, thus almost all of the neoplasms encountered were malignant.23

Follicular adenoma was the predominant benign neoplasm in this study making up 68.9% of all thyroid neoplasms with a broad peak age incidence of 30-49 years and female-male ratio of 11.2:1. This agrees with the 60.3% and 63.4% documented in two separate studies in Lagos.24, 24 However the peak age incidence in these studies was 20-29 years. A relatively high frequency of 81.4% was recorded in Enugu by Anidi et al18. Nevertheless, the patient population in Enugu was similar with follicular adenoma having a female to male ratio of 11.4:1 and peak age incidence in the 4th decade. Similarly, in two separate studies in Kenya, the frequency of follicular adenoma was 80.2% and 64.4%.21, 22 These reports however contrast the very low frequency of 5% reported in Caucasians in Sheffield, UK.23

Hurthle cell adenoma has been shown to be a very rare tumour in this study as only one case was seen in a 51-year-old female. In a similar study in Ilorin only one case was also reported.19 Our findings agree with studies done in Ile-Ife, Enugu, Kano, Kenya, Ethiopia and Sheffield where no case was recorded.13, 16, 18, 20, 22, 23 However, in Lagos, 4 of the 71 benign cases seen by Odike were Hurthle cell adenomas.25

Malignant lesions accounted for 30.2% of the neoplastic disorders in this study. Although, slightly lower than the 39.7% and 36.6% reported by Abdulkareem et al and Odike et al in separate studies in Lagos, it is much higher than the 18.6% documented in Enugu.18, 24, 25 In Kenya, Hill et al reported 35.6% and Gitau 19.7%.21, 22 In all of these studies, the frequency of benign neoplasms surpassed that of the malignant lesions. A very high frequency of malignant neoplasms (71.4%) was however, observed by Edino et al in Kano.20 We observed a peak age incidence of 30-39 years for malignant neoplasms which is in concordance with the study done by Olurin in Ibadan.4 Broad peak incidences of 21-40 years and 31-50 years were reported by Odike et al in Lagos and Edino et al in Enugu respectively.18, 25 In Addis Ababa, Ethiopia, the peak age incidence observed was 20-29 years.16

The commonest histological subtype of malignant thyroid neoplasms encountered in this study was papillary carcinoma which constituted 43.7% of malignant lesions. This is in keeping with studies done in Enugu, Kijabe-Kenya and Ethiopia in which papillary carcinoma was reported as the commonest thyroid cancers but with varying frequencies.16, 18, 22 These centres reported 42%, 58% and 77% respectively. In all these studies and ours, follicular carcinoma was the second most common malignant thyroid lesion. In Ibadan, Thomas and Ogunbiyi reported approximately equal frequencies for papillary (45.3%) and follicular (44.5%) carcinomas.26 Significantly, they observed a changing trend from follicular to papillary carcinoma, a trend they felt may be due to changes in dietary factors. Our result is however at variance with studies done in Lagos, Ile-Ife, Ilorin, Kano and Kenyatta-Kenya.13, 19, 20, 21, 24 These series had follicular carcinoma as the commonest thyroid malignancy while papillary carcinoma was the second most common. Previous studies have shown that iodine-sufficient areas have higher frequencies of papillary carcinoma while follicular carcinoma is more common in iodine deficient areas.10 This may explain the predominance of papillary carcinoma in this study.

The rarity of the other histological subtypes of malignant thyroid neoplasms has been documented in the literature.14, 20, 18, 22, 27 Undifferentiated carcinoma accounted for 12.5% of thyroid malignancy in this study; this is similar to the 13.5% earlier reported in
Enugu by Anidi et al. Ten percent was reported by Olurin et al in Ibadan and Edino et al in Kano, while Abdulkareem in Lagos and Adeniji in Ilorin documented 3% each. Gitau in Kenya-Kenya and Tsegaye et al in Addis Ababa, Ethiopia reported 15% and 6% respectively.

We observed a frequency of 9.4% for medullary carcinoma among malignant thyroid neoplasm. This value is similar to the 8% and 10% reported by Odike in Lagos and Edino in Kano respectively. A higher value of 14% was reported by Abdulkareem et al in Lagos but Nggada in Ille-Ife had a low value of 3.3%. In Addis Ababa, Ethiopia, an extremely low value of 1.5% was observed by Tsegaye and Ergete.

Conclusion

This study has shown that the histological types as well as age and sex incidences of surgical thyroid disorders do not differ significantly from earlier reports in Africa. Nodular goitre was the commonest lesion in this study. However, the observation of papillary carcinoma as the predominant malignancy in this study is at variance with most previous studies done in Nigeria where follicular carcinoma was commonly recorded as the dominant lesion. The definite rarity of inflammatory thyroid lesions was also noted.

References

Histopathological review of paediatric malignant tumours in a suburban setting

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Abstract

This study was a 5-year retrospective review of all histologically diagnosed malignant tumours in children aged 0-16 years in the department of histopathology, Irrua Specialist Teaching Hospital. A total of 306 specimens of children in this age group were received during the study period out of which 25 were malignancies. Twelve cases (48%) occurred in males while 13 (52%) occurred in females. Lymphoma was the most common histological group (60%) followed by rhabdomyosarcoma (20%). Non Burkitt non Hodgkins lymphoma was more common than other lymphoma types. Most of the cancers were located in the trunk (44%) and head and neck (32%).

Keywords: Paediatrics malignant tumours, Lympho, Rhabdomyosarcoma

Introduction

The prevalence of diseases varies from one geographic region to another. The variations are believed to be genetic/racial or environmental in origin. Pediatric malignancies are not an exception. There are documented variations in their prevalence rates in different parts of the world ranging from 2% in the United Kingdom to 10% in some African countries. The histological types encountered in different age groups also vary from one geographic region to another.

Paediatric tumour pattern in Irrua, a sub-urban town in Nigeria, however, is not known as no work has been done previously in this environment on childhood malignant tumours. This study was therefore carried out to document the frequency and the various histological types of such tumours as seen in the Histopathology department of Irrua Specialist Teaching Hospital. It is hoped that our findings will contribute to the pool of knowledge and enhance the practice of paediatric pathology in our environment. It will also help clinicians to be aware of the common tumours to expect in this age group in this environment where only few hospitals make use of histopathological facilities.

Material and Methods

The study was a 5-year retrospective analysis of all histologically diagnosed malignant tumours in children aged 0-16 years in the Histopathology department, Irrua Specialist Teaching Hospital from the time of commencement of histopathology services in the Hospital in October 2010 to September 2015. The hospital is strategically located in Edo central district of Edo State and serves as referral centre for both private and government hospitals in Edo central and Edo North districts as well as the neighboring Kogi state of Nigeria. Records of cases were obtained from the histopathology register in the department. All specimens were Formalin Fixed Paraffin Embedded (FFPE) and were sectioned and stained with haematoxylin and eosin. All the slides were reviewed using standard compound light microscope. The age, sex, and histopathological variants were analysed using simple statistics after they were presented in tables.
Result

A total of 306 specimens of children aged 0-16 years were received in the department during the study period of October 2010 and September 2015, out of which 25 (8.2%) were malignant neoplastic lesions. Twelve cases (48%) occurred in males while the remaining 13 cases (52%) occurred in females.

Table 1 shows the age and sex distribution of the various histopathological types. The most common malignant tumour was lymphoma which accounted for 60% of all cases. This was followed by rhabdomyosarcoma which accounted for 20% of cases.

Table 2 shows the distribution of the tumours according to the anatomic regions. The trunk had 11 cases representing 44% followed by head and neck with 8 cases representing 32%. The anatomic region of the tumours was not specified in 16% of cases.

Discussion

Malignant Paediatric tumours are rare. We saw only 25 cases during the 5-year period under review (5 cases/year). In Benin City, an urban Nigerian center, 84 cases were seen over a 10-year period (8 cases/year).

The difference in the two studies may be accounted for by the difference in duration of study or difference in the study population one being urban and the other being sub-urban.

Lymphoma is the most common histological type of cancer in this study. It accounted for 60% of all malignancies. Many other studies on malignant paediatric tumours in Nigeria and some other parts of Africa also reported lymphoma to be the commonest.
malignant paediatric tumour\textsuperscript{2,8,4,9,10,11,12} In contrast, however, non-Burkitt’s non-Hodgkin’s lymphomas are the most common subtype in this series accounting for 40\% of all lymphomas while Burkitt’s lymphoma and Hodgkin’s lymphoma accounted for 33.3\% and 26.7\% respectively. A decline in the frequency of Burkitt lymphoma has been reported previously in the series by Akang\textsuperscript{7}, Onwuasigwe et al\textsuperscript{,8} Akhiwu et al\textsuperscript{,13} and Mandong et al\textsuperscript{9}. Reasons adduced for this decline include improved standard of living, as Burkitt’s lymphoma is observed to be more prevalent among the low socio-economic class, and a decrease in the frequency of exposure to predisposing factors to Burkitt’s lymphoma. There was also a female preponderance of lymphomas in this study unlike in previous studies which reported a male preponderance of lymphomas.

Rhabdomyosarcoma is the second most common cancer in this study. It accounted for 20\% of all the tumours studied and this is similar to findings in Benin City and Jos\textsuperscript{9} where rhabdomyosarcoma accounted for 14.3\% and 13.1\% of paediatric malignant tumours respectively. The relative frequency of this tumour is however lower in Calabar, Ife, and Ghana with figures as low as 7\%, 6\% and 0.7\% respectively.\textsuperscript{10-12} In this study, this tumour is more common in females as it was in the Calabar study. Male preponderance is however recorded in Benin, Ife and Ghana.

Other tumours encountered includes nephroblastoma, retinoblastoma, osteosarcoma, and hepatoblastoma all of which are commonly seen in the paediatric age group.\textsuperscript{14,15,16,17} Nephroblastoma, believed to have a uniform worldwide incidence is now being reported to exhibit fluctuations in geographic incidence\textsuperscript{11,12}. In this study, it represented only 4\% of all tumours seen whereas in other studies in Nigeria, the relative frequency vary widely with figures as high as 21.4\% in some cases.\textsuperscript{13} Retinoblastoma was the second most common paediatric malignant tumour in the series by Ibadan\textsuperscript{7}, Lagos 4 and Jos 9 and occupied the third position in the study by Akhiwu et al\textsuperscript{13} in Benin City. Hepatoblastoma is the most common liver tumour in the early childhood period, most cases being recorded in the 0-4-year age bracket\textsuperscript{18}

Epithelial malignancies are rare in the paediatric age group. However, a rising incidence of these tumours especially in the 10-14-year age bracket has been reported.\textsuperscript{4} A study from Tanzania\textsuperscript{5} shows that they were among the commonest malignancies representing 9\% of all paediatric cancers. 10.7\% of paediatric cancers studied by Akhiwu et al\textsuperscript{13} were also carcinomas. In the present study only one case of epithelial malignancy accounting for 4\% was recorded.

Review of literature on regional anatomical distribution of paediatric cancers shows higher incidence in the head and neck region\textsuperscript{7,3,19} Reasons adduced for this included the high vascularity of this body region.

The head and neck region remains a most likely location for paediatric malignant tumour as 32\% of the cases in this study were in this body region. Head and neck was outnumbered only by trunk which contained 44\% of the cases in the present series. The trunk comprising the thorax and abdomen was the second most common location for pediatric malignancies in the study by Akhiwu et al in Benin.\textsuperscript{13}

**Conclusion**

This study shows that the tumour patterns among children in this sub-urban population is not much different from what obtains elsewhere in other parts of Africa, with lymphoma as the most common paediatric malignancy.

**References**

Paediatric soft tissue tumours in a sub-urban setting – retrospective histopathological review

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Abstract

This study was a 5year retrospective review of all histologically diagnosed malignant tumours in children aged 0 – 16years in the department of histopathology, Irrua Specialist Teaching Hospital. A total of 306 specimens of children in this age group were received during the study period out of which 21 were specimens of soft tissue tumours. Twelve cases (57.1%) occurred in males while 9 (42.9%) occurred in females. Vascular tumours, made up entirely of hemangioma, was the most common histological group (28.6%) followed by adipocytic tumours (lipoma) and skeletal muscle tumours (rhabdomyosarcoma) each of which constitute 23.8%. Other entities were fibroblastic tumours (19%) made up 3 fibromatoses and 1 fibrosarcoma and fibrohistiocytic tumour (4.8%).

Keywords: Paediatrics soft tissue tumours, vascular tumours, skeletal muscle tumours

Introduction

Tumours are emerging as a significant paediatric problem. In the United States, tumours are the leading cause of death in children aged 4 years and above.\textsuperscript{1}\textsuperscript{\textsuperscript{\textsuperscript{1}}}It is also the fourth leading cause of death in an autopsy study by Akang et al\textsuperscript{2} in Ibadan. An audit of paediatric mortality by Uchendu et al\textsuperscript{3} as seen at Irrua Specialist Hospital reveals malignant tumours to be the commonest cause of death after septicaemia in school age children while in pre-school children, it is outnumbered only by 5 other infectious diseases. The types of tumours encountered in children are varied but those arising from soft tissues have been listed among the most common.\textsuperscript{4}

Soft tissue tumours are extra-skeletal non-epithelial proliferations apart from those arising from viscera, meninges and lymphoreticular system.\textsuperscript{5}The patterns of these soft tissue tumours in our environment is not known. This study therefore aims at documenting the various histological patterns of paediatric soft tissue tumours as found in the Histopathology Department, Irrua Specialist Teaching Hospital.

Material and Methods

The study was a 5year retrospective analysis of all histologically diagnosed soft tissue tumours in children aged 0-16years in the Histopathology department, Irrua Specialist Teaching Hospital from the time of commencement of histopathology services in the Hospital in October 2010 to September 2015. The hospital is strategically located in Edo central district of Edo State and serves as referral centre for both private and government hospitals in Edo central and Edo North districts as well as the neighbouring Kogi state of Nigeria. Records of cases were obtained from the histopathology register in the department. All specimens were Formalin Fixed Paraffin Embedded and were sectioned and stained with haematoxylin and eosin. All the slides were reviewed using standard compound light microscope. Simple statistical analysis was employed after the age and sex of patients and histopathological variants of tumours were presented in
a table. The tumours were classified according to the World Health Organization (WHO) classification of soft tissue tumours. Approval for the study was obtained from ISTH research and ethical committee. Specimens whose records, glass slides and tissue blocks were not found were excluded from the study.

Result

A total of 306 specimens of children aged 0-16 years were received in the department during the study period of October 2010 and September 2015, out of which 21 were soft tissue tumour specimens. These occurred in 12 males and 9 females giving a male to female ratio of 1.3:1. The number of cases increased with advancing age with 10% occurring in the 0 to 4-year age group, 33% in the 5 to 9-year age group and 57% in the 10 to 14-year age group (table). The table also shows that vascular tumours, made up entirely of hemangioma, were the commonest histological entity (28.6%) followed by adipocytic tumours and skeletal muscle tumours which constituted 23.8% each (adipocytic tumours were lipoma while skeletal muscle tumours were rhabdomyosarcoma). Other soft tissue tumours encountered were fibroblastic tumours (19%) made up of 3 cases of fibromatosis and 1 case of fibrosarcoma and 1 case (4.8%) of fibrohistiocytic tumour (benign fibrohistiocytoma).

Benign tumours constituted 15 cases (71.4%) while the rest (28.6%) were malignant tumours which included 5 cases of rhabdomyosarcoma and 1 case of fibrosarcoma.

### Distribution of histological types of paediatric soft tissue tumours by age and sex

<table>
<thead>
<tr>
<th>Histological type</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>Vascular tumours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adipocytic tumours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skeletal muscle tumours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibroblastic tumours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibrohistiocytic tumours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Discussion

Tumours of soft tissues are the most common neoplasms of childhood. Igbo found 139 cases when he carried out a retrospective analysis juvenile of soft tissue tumours over a 20-year period. This amounts to a yearly average of 7 cases. In the present study, the yearly average of 4 cases is lower than that of Igbo. This may be ascribed to shorter duration of study and the fact that individuals above 16 years (which were included in Igbo’s study) were excluded in this study. It may also be because patronage of histopathological services is yet to build up because as the service is relatively new in this center.

Vascular tumours are among the commonest tumours in the paediatric age group. A wide variety of histological variants ranging from benign tumours through tumours of intermediate grade to frankly malignant tumours have been reported. However, previous studies show that most cases encountered in children are benign and in this study hemangioma made up all the cases reviewed. Similarly, in the study of soft tissue tumours by Igbo, vascular tumours accounting for 25% of all soft tissue tumours was the commonest lesion, equaled in frequency only by nerve sheet tumours in that study.

Adipocytic tumour are not uncommon in the paediatric age group and they include benign tumours, tumours of intermediate grade that are locally aggressive and frankly malignant tumours. In the series by Igbo, lipoma, lipoblastoma, myolipoma and hibernoma were reported with lipoma outnumbering the rest. All the cases reviewed in the index study are lipoma. An earlier observation that could not be substantiated in the index study is that most childhood fatty lesions are lipoblastoma and they occur predominantly in under five children. On the contrary, no case of lipoblastoma was recorded in the present study and all the fatty lesions were found in children aged 5 years and above. This rarity of lipoblastoma has been reported by previous researchers. It is however not surprising as lipoblastomas have been noted to mature into lipoma in later childhood years.

Skeletal muscle tumours differ from other types of soft tissue tumours in that they are almost all malignant. Rhabdomyosarcoma, a malignant skeletal muscle tumour, accounted for 5 of the 6 cases (83.3%) of malignancy recorded in this study, the remaining case...
being fibrosarcoma which is a fibroblastic tumour. Rhabdomyosarcoma is the most common malignant soft tissue tumour. It accounted for 14.3% of all malignant childhood solid tumours in Akhiwu et al study of solid childhood tumours in Benin City. Similarly, 13.1% of all malignant childhood tumours in Jos Nigeria were rhabdomyosarcoma. Four types of this tumour are recognized including embryonal, butryoid - a variant of embryonal, alveolar and pleomorphic rhabdomyosarcomas with the embryonal subtype (including butryoid) constituting more than 60% of cases and alveolar making up less than 1%. In the present study, embryonal and pleomorphic tumours accounted for 40% each while alveolar tumour accounted for 20%. A similar pattern was reported by Igho with the alveolar variant being the least common. Embryonal subtype was predominant in the study Akhiwu et al in Benin City and Ekanen et al in Calabar.

Fibromatosis is one of the common soft tissue tumours in the paediatric age group. In this study it accounted for 3 of the 4 cases of fibroblastic tumours encountered. Fibromatosis accounted for 26% of soft tissue tumours when Igbe et al studied benign childhood tumours in Benin City.

Conclusion

This study has shown that soft tissue tumours are not uncommon in the paediatric age group in our environment. Most cases are however benign with hemangioma and lipoma being the predominant benign tumour while rhabdomyosarcoma remains the most common paediatric soft tissue malignancy as was previously reported.

References

Prevalence and antibiotic susceptibility pattern of campylobacter associated diarrhea among children in Ilorin.

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2Department of Medical Microbiology and Parasitology, University of Ilorin Teaching Hospital, PMB 1415, Ilorin, Nigeria.

Abstract

The food borne Campylobacter species are one of the leading cause of human gastroenteritis worldwide with emerging antimicrobial resistant strains, causing about 5-14% of diarrhea cases worldwide. Poor hygiene and close proximity to animals contribute to easy and frequent acquisition of enteric pathogen including Campylobacter species in developing countries.

A cross sectional hospital based study was conducted between June and December 2015 to determine the prevalence and antibiotic susceptibility pattern of Campylobacter species causing diarrhoea among children in Ilorin, Nigeria. All inpatient and outpatient under-five years who met the inclusion criteria were enrolled in the study. Overall, 128 children with diarrhea a mean age of 18.2±9.8 months were examined. Demographic and clinical data were collected using standardized questionnaire. Stool samples were also collected for culture, Gram staining and biochemical test. An antibiotic susceptibility test was carried out on all the isolates.

Of the 128 patients examined, only 1 (0.8%) was confirmed positive for Campylobacter jejuni. Other bacteria isolated in this study include Escherichia coli (17.2%), Pseudomonas aeruginosa (5.5%), Klebsiella pneumoniae (4.7%), Proteus vulgaris (2.3%) and Salmonella typhi (0.8%). The Campylobacter spp was found susceptible to Gentamicin, Erythromycin, Ciprofloxacin and Augumentin. The finding from this study suggests that Campylobacter species may not be a common diarrheagenic agent among children in Ilorin since the prevalence of Campylobacter in this study was very low (0.8%), other enteric bacteria could probably be the source of gastroenteritis in Ilorin.

Keywords: Campylobacter, diarrhoea, Susceptibility, under-five years.

Introduction

Diarrhoeal disease is the second leading cause of death in children under five years of age, and is responsible for the death of about 760,000 children every year1. It is both preventable and treatable. Diarrhoea can be defined as passage of three or more loose watery stools per day or a more frequent than normal for an individual1. It reflects an increased water content of the stool, whether due to impaired water absorption and or active water secretion by the bowel. Most patients with acute diarrhoea have three to seven movements per day with total stool volume not less than one litre per day. Diarrhoea which lasts for 14 days or longer is regarded as persistent; while the diarrhoea which lasts for at least one month is regarded as chronic2. Diarrhoea is a symptom of infection of the intestinal tract, which can be caused by a variety of bacteria, viral and parasitic organisms1. Campylobacteriosis is a collective description for infectious diseases caused by members of the bacterial genus, Campylobacter. Campylobacter enteritis is a food and water-borne zoonotic diarrhoeal illness2. It is rapidly becoming one of the most commonly recognized causes of bacterial gastroenteritis in man and is estimated to cause 5–14% of diarrhoea worldwide3,4. In humans, the incubation period of gastroenteritis caused by Campylobacter species is between 1-10 days and most often 2 to 5 days4. Campylobacter infection has shown seasonality in its occurrence; a study done in Egypt showed that 366 episodes of Campylobacter diarrhoea were detected with isolation rates consistently higher during the warmer months between May and August3.
The age and gender distributions of Campylobacter infections are unique among enteric bacterial pathogens. In industrialized nations, two age-peaks occur: the first is at less than 5 years of age, and a second surge occurs during young adulthood, at 15 to 44 years of age. Furthermore, there is a preponderance of infections in males which begins during early childhood and persists until old age.  

Campylobacter species are Gram-negative bacilli that have a curved or spiral shape, hence their initial classification as vibrio, they are micro-aerophilic, small, thin and often joined to form zigzag shapes. Humans get infected after ingesting undercooked poultry and other meats, raw milk, contaminated foodstuffs or unchlorinated water, and after contact with infected pets or livestock. Poor hygiene, sanitation, consumption of contaminated water and close proximity to animals in developing countries contribute to easy and frequent acquisition of enteric pathogen, including Campylobacter species and this is responsible for sporadic cases in these countries. In Nigeria for instance, there is limited data available on epidemiology of Campylobacter infection in the middle belt when compared to the southwest and the northern part of the country. The only study documented in the middle belt area of the country (Ilorin inclusive) was in the year 2002 with a prevalence of 8.2%. Therefore, it is important to understand the epidemiology of Campylobacter infection in our-setting. This study aim to determine the prevalence of Campylobacter-associated diarrhoea among children aged 0-5 years and their antibiotic susceptibility pattern of in Ilorin, Nigeria.

Patients and Methods

We collected 128 faecal samples from 3 major hospitals in Ilorin, namely Children Specialist Hospital Ilorin, General Hospital Ilorin and Adewole Cottage Hospital Ilorin. 128 acute diarrhoea samples were screened over a period of six months. No patient had received antibiotic therapy up to 72 hrs prior to the collection of the samples. The patients were categorized according to age and sex. The presence of leucocytes, erythrocytes and bacilli with darting motility was determined microscopically.

To isolate campylobacter species, samples were streaked on to a campylobacter blood free selective medium, CM07393(prepared with CCDA selective supplement, SRO155E). These plates were incubated for 24-72 hours at 42°C in microaerophilic condition. Typical colonies from each suspected culture were selected and conventional bacteriological tests were performed such as catalase, oxidase, hippurate hydrolysis, urease, H2S production, to confirm the genus and differentiate them into species level.

The antibiotic susceptibility was determined using modified Kirby Bauer technique that has been carefully standardized by CLSI (Clinical and Laboratory Standard Institute) as described by 10. The isolates were inoculated on to the Mueller- Hinton agar, discs containing the following antibiotics were used. Amoxicillin (10µg), Ceftriaxone (30µg), Ciprofloxacin (5µg), Gentamicin (10µg), Erythromycin (15µg), Nalidixic acid (30µg), Nitrofurantoin (300µg), Colistin (25µg), Augmentin (30µg), Streptomycin (30µg) and Cotrimoxazole (25µg). The plates were incubated in a microaerophilic atmosphere at 42°C for 24-72 hours.

Control

Positive Escherichia coli (ATCC25922), Negative; Klebsiella pneumoniae (ATCC 13883).

Data Entry and Statistical Analysis.

All data were imputed into the computer. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) software version 16.0 and the result were expressed as percentage for qualitative variables and as mean / standard deviation for quantitative variables and tables were used for illustrations.

Ethical clearance

However, this study was not an invasive study, the study was approved by the Kwara State Ministry of Health Ethical Committee, and informed consents were obtained from each of the mothers of all the children.

Results

One hundred and twenty-eight children less than five years who presented with diarrhoea were investigated for the presence of Campylobacter species in their stools, from which, only 1 (0.78%) was positive for Campylobacter species. Age group 7-12 months has the highest prevalence (0.78%) while other age groups had a low prevalence (0%) as shown in Table 1.
The distribution of the Campylobacter species while most of the other organisms isolated are normal flora in associations with other causative pathogens of diarrhoea.

### Table 4: Prevalence of Campylobacter Isolates in Relation to Feeding

<table>
<thead>
<tr>
<th>Type of feeding</th>
<th>No Examined (%)</th>
<th>Campylobacter Isolate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast milk</td>
<td>8 (6.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Breast milk and formula</td>
<td>95 (74.2)</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Formula and family diet</td>
<td>25 (19.5)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Total</td>
<td>28 (100)</td>
<td>0 (0.8)</td>
</tr>
</tbody>
</table>

The above table shows the prevalence of Campylobacter isolate in relation to feeding. The only positive case was found in a baby boy whose mother claimed to be feeding him on breast-milk and formula although the standard of the maternal hygiene cannot be ascertained.

### Table 5: Antibiotic Susceptibility Pattern of Campylobacter jejuni

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Zones of Inhibition (Mm)</th>
<th>susceptible</th>
<th>Intermediate</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin (25μg)</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>Resistance</td>
</tr>
<tr>
<td>Ceftriaxone (30μg)</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>Resistance</td>
</tr>
<tr>
<td>Nitrofurantoin (200μg)</td>
<td>24</td>
<td>Susceptible</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Colistin (25μg)</td>
<td>24</td>
<td>-</td>
<td>Intermediate</td>
<td>-</td>
</tr>
<tr>
<td>Gentamicin (10μg)</td>
<td>22</td>
<td>Susceptible</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Erythromycin (15μg)</td>
<td>23</td>
<td>-</td>
<td>Intermediate</td>
<td>-</td>
</tr>
<tr>
<td>Streptomycin (25μg)</td>
<td>22</td>
<td>Susceptible</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ciprofloxacin (25μg)</td>
<td>25</td>
<td>Susceptible</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nalidixic Acid (30μg)</td>
<td>21</td>
<td>-</td>
<td>-</td>
<td>Resistance</td>
</tr>
<tr>
<td>Augmentin (30 μg)</td>
<td>24</td>
<td>Susceptible</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cotrimoxazole (25μg)</td>
<td>16</td>
<td>-</td>
<td>-</td>
<td>Resistant</td>
</tr>
</tbody>
</table>

The Campylobacter species isolated in this study was sensitive to Nitrofurantoin, Gentamycin, Streptomycin, Ciprofloxacin, and Augmentin. It was intermediate susceptible to Colistin and Erythromycin. However, the isolate was resistant to Ampicillin, Ceftriaxone, Nalidixic Acid and Cotrimoxazole.
Discussion

Occurrence of enteritis caused by Campylobacter species has been recorded virtually all over the world. In this study, the prevalence rate of Campylobacter enteritis in Ilorin was approximately 0.8% (1 of 128). Similar prevalence rate of 0.5% (3 of 602) was reported in Oshogbo by (Adekunle et al., 2012). However, this study is in contrast with (Adeboye, 2004) who reported a prevalence of 8.2% in a study previously carried out in Ilorin in 2002. Also, in Lagos reported prevalence of 12.4% and in 2002 at Ile-Ife, reported 19.1%. Reports from other developing countries put the prevalence rate in the range of 5-20% (Akanbi et al., 2019). The reason for the observed disparities in this present study compared to previous studies in the same city and in other parts of Nigeria cannot be ascertain.

It can also be attributed to seasonal variation by the time when those studies were carried out since it has been documented that campylobacteriosis prevalence is usually high during the raining season (Oyewole and Adeyinka, 2017). Also, large proportions of participants’ parents in this study are literates with formal education and are well informed about parental personal hygiene.

Diarrhoea is been frequently observed in children below 2 years of age or more as compared to other age group. This was confirmed in this study where by 80.5% (103 of 128) of recruited children were below 2 years of age and this agrees with the previous studies carried out in this area of study by (Adeboye, 2004), where 94.7% incidence rate was reported in children below 2 years.

The only Campylobacter isolate obtained in this study was obtained from a child below the age of two years. This agrees with earlier studies done in the country. Age specific differences in the isolation rate of Campylobacter jejuni/coli suggest that the epidemiology of infection is quite different in the developed and developing countries. The infections occur very early in life in the developing countries where Campylobacter infections are endemic with peak isolation rate occurring in children less than three years old and associated with a humoral response to Campylobacter jejuni antigens. The poor standard of hygiene, lack of sanitation and close proximity to animals that prevail in many of these countries are an ideal setting for the easy and frequent acquisition of any enteric pathogen more so, for Campylobacter species; which have been associated with chickens, dogs, sheep and unpasteurized milk. With exposure to hyper endemic infection, there is early acquisition of immunity by the children with rising concentrations of specific antibody especially immunoglobulin A. Subsequently, infection tends to be asymptomatic or mild in its clinical picture. However, the frequency of infection is reduced in children below 6 months of age who are fed with breast milk. This finding may be related to the strong baby-friendly initiative in this environment. It could also be explained by the fact that these children were not exposed to source of infection until they were old enough to move around.

There has been a preponderance of male against female in Campylobacter infection; but this study cannot ascertain the preponderance because only one Campylobacter isolate was identified. However, this study agrees with previous studies where the only Campylobacter species isolated was from a male child. The study done in Oshogbo reported that the percentage of male infection was (0.82%; 3/368) and female infection (0.0%; 0/234), while Ilorin reported 4.3% in male against 3.9% in females. Ile-Ife reported 13% in male against 5.6% in female and also reported 11.8% in male against 4.8% in females. Likewise, in industrialized nations there is a preponderance of infections in males which begins during early childhood and persists until old age (Adeboye, 2004). The reason for the gender distribution is unknown, but it could be as a result of hyperactivity in male children compared to females which may translate to increase frequency of hand to mouth behaviors in males.

Other bacteria agents found in association with the isolated Campylobacter jejuni were Escherichia coli (17.2%), Pseudomonas aeruginosa (5.5%), Klebsiella pneumonia (4.7%), Proteus vulgaris (2.3%) and Salmonella typhi (0.8%). It is very important to note that occurrence of enteritis caused by other bacteria were higher when compared with incidence of campylobacteriosis in this study. The bacteria were isolated in the stool samples, though some of them are known to be causative agent of diarrhoea but some have never been documented as cause of diarrhoea. This is in contrast with reports from Quebec (2004) who reported that prevalence of campylobacteriosis is more than the combined total caused by other bacteria such as Salmonella, Escherichia coli and others.

The observation in the control group agrees with the reports of some studies that Campylobacter
jejuni/coli are pathogenic. In contrast, another study\textsuperscript{14} reported to have isolated 6\% of Campylobacter species from one hundred control samples. Likewise, reports from other developing countries have shown recovery of Campylobacter species from children without diarrhoea. Value as high as 14.9\% has been reported\textsuperscript{22}.

This study showed that the only isolate of Campylobacter specie was from a watery stool. Although some other organisms isolated in associations were from watery, mucoid and soft formed stool. The consistency of the stool was determined by factors such as: the severity of the diarrhea illness, the stage and duration of the illness, the food and water taken by the child (this could be breast milk, formula/pap and other foods), and whether the child have begun treatment of the diarrhea or not and so also the maternal hygiene.\textsuperscript{4} reported in his findings that acute watery diarrhoea is the most common clinical feature associated with Campylobacter.

Various investigations from different parts of the world have strongly indicated the emergence of antimicrobial resistant Campylobacter strains. Campylobacter jejuni obtained in this study was sensitive to Nitrofurantoin, Gentamycin, Streptomycin, Ciprofloxacin and it was intermediate to colistin and erythromycin but resistant to Ampicillin, Ceftriaxone, Nalidixic Acid and Cotrimoxazole. For other organisms isolated in this study: Escherichia coli, Klebsiella pneumoniae, Proteus vulgaris, Pseudomonas aeruginosa and Salmonella typhi, Ciprofloxacin and Gentamycin are effective against most of the isolates, Ceftriaxone was sensitive only to Escherichia coli but resistance was seen in most of the organisms to Augmentin and Ceftazidime. The pattern of susceptibility of Campylobacter jejuni in this study is similar to that of \textsuperscript{14} where all isolates were susceptible to Gentamycin, and Ciprofloxacin amongst other agents. Also, \textsuperscript{9} reported the susceptibility of all their isolates to Ciprofloxacin and Gentamycin. Erythromycin was reported as intermediate in this study which contrasts the report of \textsuperscript{9} and \textsuperscript{14} where all their isolates were susceptible to Erythromycin. However, increasing erythromycin resistance from 0\% to 18\% \textsuperscript{23} and then 79.2\% was reported in Lagos, Nigeria\textsuperscript{14}.

On the other hand, Campylobacter was found resistant to Ampicillin, Ceftriaxone Nalidixic Acid and Cotrimoxazole. This is in agreement with the report of \textsuperscript{9} where he reported resistance of isolates to Ampicillin, Ceftriaxone, Nalidixic acid and Cotrimoxazole and \textsuperscript{14} reported resistance to Cotrimoxazole. Also,\textsuperscript{24} (Seble, 2014) reported same resistance pattern in Ethiopia. The high rate of resistance may be due to use and misuse of this antibiotic in the treatment of some infection such as ear infections and gastro intestinal symptoms. Campylobacter enteritis though usually a self-limiting infection, antibiotics may be indicated for treatment of the more severe cases. But the resistance to these antibiotics has limited its use in the treatment of infections with Campylobacter species. Even the antibiotics to which the isolate was susceptible, there is need for caution in their use as there are rapidly increasing proportion of Campylobacter strains found to be antibiotics resistant worldwide\textsuperscript{25}.

**Conclusion**

This study reveals 0.8\% prevalence of Campylobacter species causing diarrhoea among children under 60months old attending hospitals for treatment in Ilorin, Nigeria. Other bacteria also isolated in association to Campylobacter in this study include Escherichia coli (17.2\%), Pseudomonas aeruginosa (5.5\%), Klebsiella pneumoniae (4.7\%), Proteus vulgaris (2.3\%) and Salmonella typhi (0.8\%).

There was no association between the usage of tap water, well or river/lake water, bottled water or boiled water with Campylobacter and other identified organisms, but there was an association with the type of foods given to the children, the educational level of the parents and their socio-economic status. The preponderance of male against female was also not obtained because only one Campylobacter isolate was obtained which was from a male child. This finding suggests that Campylobacter species has seasonal variation as an agent of diarrhoea among children in Ilorin, since the prevalence of Campylobacter in this study was low (0.8\%) as compared to other study previously done in the same locality;

**Recommendation**

Health education on hygienic food preparation and other preventive measures should be sustained and intensified against children dietary diarrhoea disease. Further studies that will span over a period of at least one year should be carried out in hospitals and rural settings to
ascertain prevalence of *Campylobacter* in Nigeria. There is also the need for Surveillance of other diarrhoeic agent in children less than five years of age.

**Limitation of the study**

Culture that does not grow any bacteria does not rule out infection due to certain factors such as time difference between sample collection and sample analysis, honesty of the parents on the use of antibiotics for their children, prior visit to the hospital and the amount of the sample collected.

**References**

Prevalence of *Chlamydia trachomatis’* urinary tract infection among pregnant women at a tertiary hospital in Edo State, Nigeria.

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\textsuperscript{2}Department of Medical Microbiology and Parasitology, Ambrose Alli University, Ekpoma  
\textsuperscript{3}Department of Microbiology, Ambrose Alli University, Ekpoma

**Abstract**

Urinary tract infections (UTI) are detected in 2-57\% of pregnant women. In Nigeria, a number of women had bad pregnancy outcomes and complications, the causes of which are not usually obvious. *Chlamydia trachomatis* infections in pregnancy being a major cause of complications of pregnancy and the infections being mostly asymptomatic, this study therefore aim at determining the prevalence of *C. trachomatis* UTI among pregnant women in a tertiary hospital in Nigeria.  

30 mls of early morning, clean-catch, first-voided urine samples were collected from 110 consented pregnant women attending Antenatal Clinic of the Irrua Specialist Teaching Hospital, Irrua between July and December, 2010 into a sterile, screw-cap, leak-proof universal bottle. *C. trachomatis* antigen was subsequently tested at the Medical Microbiology Laboratory using One-step Chlamydial test kit, a rapid qualitative immunochromatographic Chlamydial antigen assay kit.  

29 (26.36\%) and 81 (73.64\%) were single and married respectively. Thirty-six (32.73\%) participants were in the first trimester of pregnancy while 41 (37.27\%) and 33 (30.0\%) participants were in the second and third trimesters respectively. Nine participants were positive for urinary *C. trachomatis* test, giving a prevalence of 8.18\% in this study.

It is recommended that urine of pregnant women, especially those with symptoms of UTI, previous STI and history of multiple sexual partners should be tested for *Chlamydial trachomatis* infection.

**Keywords:** Chlamydia trachomatis, UTI, pregnancy, Nigeria

**Introduction**

Urinary tract infections (UTI) are detected in 2-57\% of pregnant women\textsuperscript{1-5}. It is an indication for additional specialist care in pregnancy\textsuperscript{6}. Asymptomatic urinary tract infections are unusually common during pregnancy\textsuperscript{7}. Twenty to 30\% of pregnant women with asymptomatic bacteriuria subsequently develop pyelonephritis\textsuperscript{8}. Increased incidences of low birth weight, premature delivery and neonatal death result from UTI during pregnancy\textsuperscript{9}. In some women with acute urinary infections, sexually transmitted urethritis-producing agents such as *Chlamydia trachomatis* are etiologically important. An estimated over 50 million new cases of *C. trachomatis’* infections occurs worldwide annually\textsuperscript{10}. Seventy-five per cent of infected women are asymptomatic and are completely unaware of the infection\textsuperscript{11,12}. *C. trachomatis* is a major cause of infertility, not only in women, but also in men\textsuperscript{11}. In untreated women with chlamydial infection, 40\% develop pelvic inflammatory disease (PID). Of these women, 20\% become infertile, 18\% develop chronic pelvic pain, and 9\% have potentially life-threatening ectopic pregnancy\textsuperscript{13,14,15}. *C. trachomatis* infection in pregnant women can result in premature delivery, intrauterine growth retardation, low birth weight, ectopic pregnancy, premature rupture of membrane, spontaneous abortion, PID, and Neonatal infections and death\textsuperscript{1,5,16,17,18}.

In Nigeria, a number of women had bad pregnancy outcomes and complications, the causes of which are not usually obvious. *C. trachomatis* infections in pregnancy being a major cause of complications of pregnancy and the infections being mostly asymptomatic, this study therefore aim at determining...
the prevalence of *C. trachomatis* UTI among pregnant women in a tertiary hospital in Nigeria.

**Materials and Method**

One hundred and ten (110) consecutive pregnant women attending Antenatal Clinic of the Irrua Specialist Teaching Hospital, Irrua between July and December, 2010 were screened for eligibility. Consented pregnant women (Urine HCG assay positive with amenorrhoea), age between 15 to 44 years and clinically stable were included in the study. Sociodemographic features and a history of previous urinary tract infection were obtained by standard interviewer-administered questionnaire. Other risk factors for *C. trachomatis* infection such as previous sexually transmitted infections, multiple sexual partners and frequency of coitus in pregnancy were sought for. Detailed physical examinations were performed.

Early morning, clean-catch, first-voided urine (30mls) samples were collected into a sterile, screw-cap, leak-proof universal bottle. *C. trachomatis* antigen was subsequently tested using One-step Chlamydial test kit, a rapid qualitative immunochromatographic Chlamydial antigen assay kit from Chemicalskey, Zhejiang, China (sensitivity > 99.5% and specificity > 95%). Positive and negative controls were included in each batch of tests to confirm appropriateness of test procedure and reliability of test results.

Data were entered into SPSS version 15.0, checked for validity and subsequently analyzed. Summary statistics were calculated. Results were compared between women with and without risk factors for *C. trachomatis* UTI. Comparison of proportion was done using Chi-square and statistical significance was set at p<0.05.

**Results**

A total of 110 consecutive pregnant women age between 15 and 44 years were evaluated. Participants’ parity ranges from one to six, modal parity being three (Table 1).

Concerning the marital status of the participants, 29 (26.36%) and 81 (73.64%) were single and married respectively. Thirty-six (32.73%) participants were in the first trimester of pregnancy while 41 (37.27%) and 33 (30.0%) participants were in the second and third trimesters respectively (Table 2). Concerning risk factors for *C. trachomatis* infections, 33 (30.0%) were symptomatic for UTI; 48 (43.64%) had history of previous sexually transmitted Infections and 40 (36.36%) had history of multiple sexual Partners. Thirty-seven (33.64%) participants frequently (at least once a week) had coitus in pregnancy, while 31 (28.18%) occasionally (once or twice per month) and 42 (38.18%) rarely (less than once a month) had coitus in pregnancy.

<table>
<thead>
<tr>
<th>Parity</th>
<th>Frequency</th>
<th>No. of <em>C. trachomatis</em> Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nulliparous / primigravida</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>21</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gestational age (weeks)</th>
<th>Frequency</th>
<th>No. of <em>C. trachomatis</em> Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-13</td>
<td>36</td>
<td>2</td>
</tr>
<tr>
<td>14-27</td>
<td>41</td>
<td>5</td>
</tr>
<tr>
<td>28-40</td>
<td>33</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
<td>9</td>
</tr>
</tbody>
</table>

Nine participants were positive for urinary *C. trachomatis* test, giving a prevalence of 8.18% in this study. Distribution of participants in relation to parity and *C. trachomatis* test positivity is shown on Table 1. There is no statistically significant association between parity and *C. trachomatis* positivity.

Five out of the nine seropositive participants were unmarried, making the percentage positivity among single and married to be 17.24% and 4.94% respectively.

Five (55.56%) out of the nine participants positive for *C. trachomatis* were in the second trimester, while 2 (22.22%) each were in the first and third trimesters.
There is no statistically significant association between gestational age and *C. trachomatis* positivity.

Six (66.67%) out of the nine participants positive for *C. trachomatis* were symptomatic for UTI. There is significant statistical association between UTI and *C. trachomatis* positivity in the study. Thus, UTI in pregnancy is a risk factor (Table 3).

Table 3: Relationship between risk factors and *C. trachomatis* infections.

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>% Chlamydial positive</th>
<th>X²</th>
<th>p-value</th>
<th>Significance (p-value &lt; 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parity</td>
<td>As in table 1</td>
<td>12.48</td>
<td>3.36</td>
<td>NS</td>
</tr>
<tr>
<td>Gestational age</td>
<td>As in table 2</td>
<td>16.64</td>
<td>11.26</td>
<td>NS</td>
</tr>
<tr>
<td>UTI</td>
<td>6 (66.67%)</td>
<td>62.16</td>
<td>0.02</td>
<td>S</td>
</tr>
<tr>
<td>STI</td>
<td>7 (77.78%)</td>
<td>82.45</td>
<td>0.01</td>
<td>S</td>
</tr>
<tr>
<td>Multiple Sexual partner</td>
<td>8 (88.89%)</td>
<td>101.51</td>
<td>0.00</td>
<td>S</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Single 5 (55.56%);</td>
<td>56.42</td>
<td>0.04</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Married 4 (44.44%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coitus in Pregnancy</td>
<td>Frequently 33.64%</td>
<td>10.15</td>
<td>2.26</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Occasionally 28.18%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rarely 38.18%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S : Significant; NS: Not significant

Eight (88.89%) and 7 (77.78%), out of 9 participants positive for *C. trachomatis* also had multiple sexual partners and history of STI respectively. There are statistically significant associations between having multiple sexual partners, previous STI and *C. trachomatis* infections (Table 3).

There is no statistically significant association between frequency of coitus in pregnancy and *C. trachomatis* infections. However, there is statistically significant association between marital status and *C. trachomatis* infections. (Table 3)

**Discussion**

Prevalence of *Chlamydia trachomatis* UTI among pregnant women attending Antenatal care clinic in Irrua specialist Teaching Hospital, Irrua is 8.1%. This is low compared to prevalence of *C. trachomatis* infection among women in other studies in various locations in Nigeria. AC Ikeme et al. found a prevalence of 29.1% in Enugu among women attending gynaecological clinic for secondary infertility, PID and STD; while Mawak JD got a prevalence of 56.1% in Jos among Gynaecological clinic attendees. A prevalence of 30.2% was seen among female University students in Port Harcourt by AUH Arinze et al. The relatively low prevalence value in this study can be explained by the differences in the type of specimen and studied populations. While most studies used endocervical swab or blood as the specimen, this study used patient’s urine. The pathogen, *Chlamydia trachomatis* has preference for endocervix and can be harvested more with endocervical swabs than from the urine. The Jos and Enugu studies were among patients with gynaecological problems of infertility, PID and STI which can be caused by *Chlamydia trachomatis*, hence the high prevalence among this population. Similarly, high prevalence value among the undergraduates in Port Harcourt is not surprising since most of them are not married and they have multiple sexual partners: risk factors for *chlamydia trachomatis* infections. However, the prevalence in this study is similar to 13.2% found in Ile-Ife by TO Okunola among similar population in the antenatal clinic.

The prevalence of *Chlamydia trachomatis* infection was higher among the singles than the married and it is statistically significant. This similar to findings in literatures and other studies. Women in the second trimester also had higher prevalence than those in first and third trimesters. However, there is no statistically significant association between gestational age and occurrence of *Chlamydia trachomatis* infection. Sexual activity in pregnancy is not a risk factor to chlamydial infections, hence it should not be discouraged among pregnant women. The parity of a woman has no significant association with risk of *chlamydia trachomatis* infection as the transmission of the diseases has nothing to do with parturition.

Other risk factors for the infection in this study are: presence of UTI symptoms, multiple sexual partners and previous STI. These risk factors are identical to the findings of other researchers in Nigeria and abroad. *Chlamydia trachomatis* is one the commonest cause of STI and it is commoner among young women with multiple sexual partners.
From this study, it can be recommended that urine of pregnant women, especially those with symptoms of UTI, previous STI and history of multiple sexual partners should be tested for chlamydial trachomatis infection. The test is simple, not as invasive as using blood or endocervical swab specimen; and can be done as a point of care test. This will help in early detection and prompt treatment of infected women and ultimately reduce or eliminate the risk of complications associated with the infection. However, a comparative study between the use of urine specimen and endocervical swab will inform better recommendations.

**Conclusion**

We recommend that lipid profile as well as other tools of atherogenicity be estimated and holistically looked into so that early medical intervention can be put in place to bring to the barest minimum the occurrence of CVD in clients with PCOS.

**References**


Relationship between biochemical indicators of atherogenicity and polycystic ovarian syndrome (PCOS) among subfertile female clients attending the IVF unit of the UITH.

AbdulAzeez IM¹, Biliaminu SA¹,³, Akande AA¹, Okesina AB¹, Olatinwo AWO²,³, Omokanye LO²,³, Nyamgee A⁴

¹Department of Chemical Pathology and Immunology.
²Department of Obstetrics and Gynaecology.
³Assisted Reproductive Therapy Unit (UITH, Ilorin).
⁴Department of Medical Microbiology. University of Ilorin, Ilorin, Kwara State, Nigeria.

Abstract

Introduction: Atherosclerotic vascular disease is more frequent in men than in premenopausal women. Finding a male pattern of lipoprotein lipids in women with polycystic ovary syndrome (PCOS) could potentially be at greater risk for atherosclerotic vascular disease than are in normal premenopausal women with regular menstrual periods. We therefore aim to investigate the relationship between lipoprotein lipid concentrations and hormonal profiles of women with polycystic ovary syndrome and compare to those of normal menstruating women.

Materials and Methods: This study was a retrospective cross-sectional study done at the Assisted Reproductive Unit of University of Ilorin Teaching Hospital, Ilorin, Kwara state; Nigeria between January 2012 and August 2015. Serum fasting total cholesterol (TC), triglycerides(TGs), high densitylipoprotein cholesterol (HDL-C),andlow-densitylipoprotein cholesterol (LDL-C) levels were measured in 50 women with (PCOS) attending Assisted Reproductive Unit, University of Ilorin Teaching Hospital, Ilorin; Kwara state. The PCOS clients were not on hormonal therapy and the 38 normal clients of the same age range not using oral contraceptives were also recruited as controls. Statistical comparison between serum hormonal profiles as well as lipids profiles and biomarkers of atherogenic index were made and inferences from this were made.

Results: Women with (PCOS) have statistical significant elevations in the mean values of FSH, LH, prolactin, Oestradiol, testosterone and high LH/FSH ratio than in controls, while there was no significant increase in mean serum level of progesterone in subjects than in controls. There were significant elevations in the mean values of total cholesterol, triglycerides, HDL-C and LDL-C, in polycystic ovarian syndrome subjects when compared with controls. There was no statistically significant difference when mean coronary heart disease risk ratio, index and Castelli I ratio of subjects were compared to those of controls while there were statistically significantly difference when mean values of Castelli II and atherogenic index of subjects were compared with those of controls.

Conclusions: In this study, the serum estradiol level was significantly higher in PCOS than in controls. This may explain the low CHD-risk ratio and Castelli I ratio in PCOS than in controls. However testosterone is significantly high in PCOS than in control. Testosterone may be responsible for the change in cholesterol to male type in PCOS patients as such the increase in atherogenic index and Castelli II ratio which could serve as early predictor of cardiovascular events than the previous atherogenic biomarkers tools. It is therefore highly recommended that atherogenic index and Castelli II ratio be used as early detector of Atherogenicity in PCOS and possibly other possible causes of atherosclerosis.

Key words: Relationship, Premature ovarian failure and lipid profile.

Introduction

Polycystic ovary syndrome (PCOS) is one of the most common causes of endocrine dysfunction in women of reproductive age with a prevalence that ranges from 4% to 7%.¹,² It is a heterogeneous collection of signs and symptoms that together form a spectrum of disorders with mild presentation in some, while in others presents with severe disturbance of reproductive, endocrine and metabolic functions.³

The major clinical features are menstrual cycle disturbance, hyperandrogenism and polycystic ovaries.
This triad of symptoms is commonly accompanied by obesity and infertility. PCOS is responsible for about 75% of anovulatory infertility. The morphology of the polycystic ovary, has been redefined as an ovary with 12 or more follicles measuring 2-9 mm in diameter and increased ovarian volume (>10 cm 3) on transvaginal ultrasound.

Polycystic ovarian syndrome (PCOS) is a common endocrine disorder that has a strong genetic component with prevalence in the 5-10% range reported worldwide. There is limited data on the incidence of PCO in Africa, and compared to Caucasian women, Nigerian (Yoruba) women show a higher tendency towards exaggerated ovarian response to stimulation for assisted conception associated with a higher prevalence of PCOS. Polycystic ovarian syndrome is believed to be primarily a disorder of androgen excess; affected women frequently present with abdominal adiposity and insulin resistance, explaining the association of PCOS with metabolic co-morbidities and an increased cardiovascular risk.

Atherosclerotic vascular disease is more frequent in men than in premenopausal women. This difference has been ascribed in part, to differences in serum lipoprotein profiles since women have, on the average, higher high density lipoprotein cholesterol and lower low density lipoprotein cholesterol concentrations. This metabolic variation between men and premenopausal women may be related to differences in sex steroids, even though the exact mechanisms by which these effects occur are unknown. Evidence abounds that testosterone in men is a key factor regulating HDL levels and composition.

The serum lipoprotein lipid pattern in women with polycystic ovary syndrome gives further insight into the influence of endogenous sex steroids on lipid profile between men and premenopausal women. Finding a male pattern of lipoprotein lipids in women with polycystic ovary syndrome could potentially be at greater risk for atherosclerotic vascular disease than are normal premenopausal women with regular menstrual periods. We therefore aim to investigate the relationship between lipoprotein lipid concentrations and hormonal profiles of women with polycystic ovary syndrome and compare to those of normal menstruating women.

Materials and Method

This study was a cross-sectional retrospective study done at the Assisted Reproductive Unit of University of Ilorin Teaching Hospital, Ilorin, Kwara State; Nigeria between January 2012 and August 2015. A total of 50 female clients samples with polycystic ovarian syndrome that constitutes a subset of sub-fertile patients attending the facility were analyzed for the study. The age ranges between 20-45 years, while blood samples of 38 healthy clients matched for age and sex with the patients were analyzed as control. The clients’ results of serum hormonal profile (LH, FSH, prolactin, Progesterone, oestradiol, which was analyzed using Accubind ELISA kits, Total cholesterol was estimated by Cholesterol Oxidase Method. HDL-c and LDL-c were also estimated by enzymatic method while triglycerides were estimated using glycerol-3 phosphate oxidase method using commercially prepared kit by Agappe Diagnostics Ltd. All the analysis was done by the chemical pathologists in the research using Rayto Microplate Reader for the hormonal assay, and Rayto Chemistry Auto-analyzer for the lipid profile.

Other descriptive parameters and information were extracted from their hospital folders. Statistical analysis was done using Statistical Package for Social Science (SPSS version 20.0); Results were expressed as means± SD. Paired sample t-test was used to compare means of results where appropriate. A p-value less than 0.05 was considered significant.

Results

There was no statistically significant difference when the mean age of polycystic ovarian syndrome patients when compared with that of controls (Table1). There were statistically significant differences when the mean fertility profile of clients with polycystic ovarian syndrome were compared to that of controls (p-value <0.05). Significant elevations were observed in the mean values of FSH, LH, prolactin, Oestradiol, testosterone and high LH/FSH ratio in subjects than in controls (Table1), while there was no significant increase in mean serum level of progesterone in subjects than in controls (Table1).

There were statistically significant differences when the mean lipid profiles of polycystic ovarian syndrome
subjects were compared with that of controls (p <0.05). Significant elevations were observed in the mean values of total cholesterol, triglycerides, HDL-C and LDL-C, in polycystic ovarian syndrome subjects when compared with controls (Table 2).

There was no statistically significant difference when mean coronary heart disease risk ratio, index and Castelli ratio I of subjects were compared to those of controls while there was statistically significantly difference when mean values of Castelli atherogenic index of subjects were compared with those of controls (Table 3).

### Table 1: Comparing Mean Values of Fertility Profile in Polycystic Ovarian Syndrome Subjects and the Control Using Paired Sample t-Test.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subjects</th>
<th>Control</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (Years)</td>
<td>25.3±7.0</td>
<td>26.4±5.5</td>
<td>0.058</td>
</tr>
<tr>
<td>Mean FSH (mIU/ml)±S.D</td>
<td>7.8±5.6</td>
<td>7.3±0.8</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean LH (mIU/ml) ±S.D</td>
<td>30.7±8.8</td>
<td>4.9±1.8</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean Prolactin (ng/ml) ±S.D</td>
<td>19.8±11.9</td>
<td>14.2±2.5</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean Prog (ng/ml) ±S.D</td>
<td>5.1±5.5</td>
<td>4.9±5.4</td>
<td>0.765</td>
</tr>
<tr>
<td>Mean Oestr (pg/ml) ±S.D</td>
<td>157±77.9</td>
<td>101.8±42.3</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean Testo (ng/ml) ±S.D</td>
<td>2.0±0.05</td>
<td>0.31±0.07</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean LH/FSH RATIO±S.D</td>
<td>3.5±2.2</td>
<td>0.68±0.23</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

### Table 2: Comparing Mean Values of Lipid Profile in Polycystic Ovarian Syndrome Subjects and the Control Using Paired Sample t-Test.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subjects</th>
<th>Control</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean T-C (mmol/L) ±S.D</td>
<td>5.3±1.8</td>
<td>3.5±0.5</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean Trig. (mmol/L) ±S.D</td>
<td>1.5±0.7</td>
<td>1.0±0.2</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean HDL-C (mmol/L) ±S.D</td>
<td>2.3±1.0</td>
<td>1.3±0.3</td>
<td>0.000*</td>
</tr>
<tr>
<td>Mean LDL-C (mmol/L) ±S.D</td>
<td>1.6±0.6</td>
<td>1.3±0.2</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

### Table 3: Comparing Mean Values of Biomarkers of Atherogenicity in Polycystic Ovarian Syndrome Subjects and the Control Using Paired Sample t-Test.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subjects</th>
<th>Control</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean CHD-RR 0.43±0.08</td>
<td>0.36±0.09</td>
<td>0.430</td>
<td></td>
</tr>
<tr>
<td>Mean atherogenic index -0.15 ± 0.20</td>
<td>-0.11± 0.72</td>
<td>0.000*</td>
<td></td>
</tr>
<tr>
<td>Mean Castelli ratio I 2.53±0.62</td>
<td>2.88±0.55</td>
<td>0.103</td>
<td></td>
</tr>
<tr>
<td>Mean Castelli ratio II 0.79±0.29</td>
<td>1.69±0.44</td>
<td>0.000*</td>
<td></td>
</tr>
</tbody>
</table>

### Discussion

The findings of elevated TC, TG and LDL-C were in agreement with some previous studies. 

However, in our study, there is statistically elevated levels in HDL-C in PCOS women to controls (2.3 ± 1.0 vs 1.3 ± 0.3, (p <0.05) as against previous studies, 15, 16, 17. These points to the fact that dyslipidaemia is a feature of PCOS and this dyslipidaemia is widely acknowledged to increase incidence of atherosclerosis and its implications. Patients with PCOS have been recognized to have low estrogen and high testosterone as well as very high LH relative to serum FSH. In this study however the estrogen level is significantly higher in PCOS than in controls. This may explain the low CHD-risk ratio and Castelli I ratio in PCOS than in controls. Testosterone is significantly high in PCOS than in control. Testosterone may also be responsible for the change in cholesterol to male type in PCOS patients as such the increase in atherogenic index and Castelli II ratio which could serve as good predictor of cardiovascular events in PCOS.

### Conclusion

We recommend that lipid profile as well as other tools of atherogenicity be estimated and holistically looked into so that early medical intervention can be put in place to bring to the barest minimum the occurrence of CVD in clients with PCOS.

### References


11. Goldberg RB, Rabin D, Alexander AN, Doelle GC, Getz GS (1985) Suppression of plasma testosterone leads to an increase in serum total and high density lipoprotein cholesterol and apoproteins A-I and B. J Clin Endocrinol Metab 60:203


Sexual assaults in a sub area of Nigeria

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Abstract

Background: Sexual assault is a violent crime directed predominantly against women and occurs in all ages, racial, ethnic and socio-cultural groups. It is the most under reported crime in the United States of America and other parts of the world. Only 30% of sexual assaults are reported to the police and 50% of rape victims tell no one of the incident.

Objectives: this study was design to evaluate the magnitude of sexual assaults in our environment, determine the sociodemographic characteristics of the victims and highlight the problem associated with management of the cases.

Method: This was a five year review of cases at Irrua Specialist Teaching Hospital. Twenty five cases of sexual assault were recorded between January 2009 and December, 2013. However, only 17 cases were available for analysis. The sociodemographic characteristic, types of injury and modalities of management were reviewed and the findings were represented in the statistical tables.

Results: The incidence of sexual assault in this study was 2.3% of the total gynaecology admissions. The age range of the victims was 3-22 years with a mean age of 9.3 years. Majority of the patients, 22 (88.2%) cleaned up their body before presentation at the hospital. Hymenal laceration and vaginal laceration were reported in 23.0% and 17.7% of the patients respectively. However, 52.9% of the patients had no obvious genital tract injury. The interval between sexual assaults and presentation at health facility was 3 hours to 2 months with a median interval of 6days. Only 29.4% of patients were screened for the Human Immunodeficiency Virus and they were all negative. Post exposure prophylaxis was given to 29.4% of the patients and 11.8% had examination under anesthesia and repair of vaginal laceration. In majority of cases (88.2%) the identity of the assailant was known to either the victim or her family.

Conclusion: Sexual assault is an important but under-reported public issue. Late presentation impairs management and precedes physical and emotional trauma.

Keywords: Sexual, Assault, Child sexual abuse and Rape

Introduction

Sexual assault is a violent crime directed predominantly against women. It is defined as any non-consensual sexual gesture by one person on another. Sexual assault includes genital, oral or anal penetration by part of the accused's body or by an object. It has also been extended to any nonconsensual contact with the intent of sexual gratification. It may result from force, the threat of force either on the victim or another person, or the victim's inability to give appropriate consent. Many states have now adopted the gender-neutral legal term; sexual assault in favour of rape, which has traditionally referred to forced vaginal penetration of a woman by a male assailant. It occurs in all age, racial and socio-ethnic group but more prevalent in the industrialized society and highly under reported in poor developing world. The very young, elderly and the physically or developmentally disabled may be particularly vulnerable to sexual assault. Reported incidence figures vary greatly among countries and do not provide true indication of the extent of the problem. Nigeria is seriously under the grip of rape and hardly a day goes by without news of bizarre cases of rape either by a law enforcement agent taking advantage of a female suspect, a teacher and his student, a father or some other intimate family members. While Ekabue et al. from Calabar and
Adeleke NA et al reported same incidence of 2.1%, Kullima AA et al showed a higher incidence of 13.8% and an even higher figure of 14% in Uganda. The British Crime Survey found that in 20 women had been sexually abused. In the United States of America, as many women will be sexually assaulted during their lifetime as will develop breast cancer and it is estimated that 700,000 to 1000,000 American women are sexually assaulted every year but only 30% are reported. It is associated with exceptionally high attrition and low conviction rates in comparison to other offences and this is due to lack of evidence and absence of witness. Victims are faced with the issue of social stigma, prejudice to the chance to manage the attendant humiliation and shame, embarrassment caused by appearance and cross-examination in court as well as the physical and psychological trauma. Child sexual abuse which is defined as contact or interaction between a child and an adult when the child is being used for sexual stimulation of that adult or another person contributes significantly to the incidence of this crime. In Nigeria, children of elementary school (6-12 years) and adolescent (13-19 years) are victims of sexual assault and 48.2% of reported cases occur in children below 13 years. In developed world, failure of a physician to report sexual assault against children may subject the physician to fines or incarceration for up to 1 year but this is not so for the developing world. Approximately 50% of sexual assault occurs in the victim's own house and more than 80% occur within the victim's neighborhood with 20% of the victims being able to identify the rapist by name. Timketa et al showed that 38.95%, 7.9% and 13.4% of the assailants were neighbors, teachers and relatives respectively to the victim. This was also confirmed in another study, with lecturers being implicated in 7.1% of cases. Majority of victims do not report the incidence to the police and this maybe due to fear of not being believed, fear of court process, fear of assailant and embarrassment and fear of further examination. Most sexually active victims do not have genital injuries but may have other injuries if force was applied.

The management of the patient must be empathic and include treatment of any immediate emergency, addressing other health issues like prevention of sexually transmitted infections including HIV, emergency contraception, psychological therapy as well as collection of forensic materials which will aid prosecution of assailant. In Western society, there is collaboration between the police and health services to develop sexual assault referral centres (SARCS) which help to minimize DNA contamination and thus enhance availability of forensic materials.

Sexual assault is an important public issue and an act of violence perpetrated mainly against women with adverse physical and psychological consequences. To further emphasize the importance and the need for protection of the girl child, a day has been set aside as the international girl child day and is currently being celebrated every October 11. The need for physicians to be acquainted with the magnitude of this crime and be knowledgeable in empathic management of victims cannot be over emphasized.

Materials and Methods

It was a five year review of cases of sexual assault between 2009 and 2013. Information on sociodemographic characteristics of victims, types of injury and modalities of management were retrieved from the case notes and analysed.

Results

A total of twenty five cases of sexual assault were recorded within the study period while we had 1064 gynaecological cases. However only 17 case notes were available for analysis. This gave a prevalence of 2.3% the 17 cases that had complete information were used subsequently for analysis.

Table I shows the sociodemographic characteristics of victims of sexual assault. The age distribution of the patients in the study was between 2-22 years, with an average of 9.3 years. Majority of the cases were from the Esan speaking tribe (88.2%). Eleven (64.7%) of the seventeen victims analysed had primary level of education while 41.2% were from the monogamous family setting.

Table II shows the modalities of management of patient. Retroviral screening was done for 29.4% of victims with negative results and they all had post exposure prophylaxis. Antibiotics for the prevention of sexually transmitted infections were given to 55.8% of
the patients and 17.6% had emergency contraception.
The interval between sexual assault and presentation in
the health facility was between 3 hours to 2 months
with a median interval of 6 days and 88.2% of the
victims had cleaned up their bodies before presentation
at our health facility. Examination under anesthesia and
repair of vaginal laceration was done for 11.8% of the
victims in this study. The police were involved in the
management of 47.1% of cases and only 29.4% of
patients presented for follow up.

Table 1: Sociodemographic characteristics of
enrolled victims.

<table>
<thead>
<tr>
<th>Age(yrs)</th>
<th>Number</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>2-6</td>
<td>9</td>
<td>53.0</td>
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<tr>
<td>7-11</td>
<td>2</td>
<td>11.7</td>
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<tr>
<td>12-16</td>
<td>3</td>
<td>17.6</td>
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<td>17-22</td>
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<td>17.6</td>
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<tr>
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<thead>
<tr>
<th>Tribe</th>
<th>Number</th>
<th>Percentage</th>
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<tr>
<td>Esan</td>
<td>15</td>
<td>88.2</td>
</tr>
<tr>
<td>Etsako</td>
<td>5</td>
<td>5.9</td>
</tr>
<tr>
<td>Owan</td>
<td>3</td>
<td>17.6</td>
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<tr>
<td>Total</td>
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<th>Educational level</th>
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<td>64.7</td>
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<tr>
<td>Secondary</td>
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<td>17.6</td>
</tr>
<tr>
<td>Tertiary</td>
<td>3</td>
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<tr>
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<tr>
<th>Family setting</th>
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<th>Percentage</th>
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<tr>
<td>Monogamous</td>
<td>7</td>
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<tr>
<td>Polygamous</td>
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<tr>
<td>Single parents</td>
<td>3</td>
<td>17.6</td>
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<tr>
<td>Not stated</td>
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<td>29.4</td>
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<tr>
<td>Total</td>
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<table>
<thead>
<tr>
<th>Previous pregnancies</th>
<th>Number</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Previous termination of Pregnancies</td>
<td>2</td>
<td>11.2</td>
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<tr>
<td>No previous termination of Pregnancy</td>
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<td>88.2</td>
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<tr>
<td>Total</td>
<td>17</td>
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Table III shows the identity of the assailant and place
of assault. In 88.2% of cases victim knew the assailant
and most common place of assault was at home.

Table 2: Mode of management

<table>
<thead>
<tr>
<th>HIV screening</th>
<th>Number</th>
<th>Percentage</th>
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<tr>
<td>HIV test done</td>
<td>5</td>
<td>29.4</td>
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<tr>
<td>HIV test not done</td>
<td>12</td>
<td>70.6</td>
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<tr>
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<thead>
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<th>Post exposure Prophylaxis(pep)</th>
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<th>Percentage</th>
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<td>Used pep</td>
<td>5</td>
<td>29.4</td>
</tr>
<tr>
<td>No pep</td>
<td>12</td>
<td>70.6</td>
</tr>
<tr>
<td>Total</td>
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<td>100</td>
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<table>
<thead>
<tr>
<th>Interventions</th>
<th>Number</th>
<th>Percentage</th>
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<tr>
<td>STI prophylaxis</td>
<td>10</td>
<td>58.8</td>
</tr>
<tr>
<td>Emergency contraception</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td>EUA/repair of lacerations</td>
<td>2</td>
<td>11.8</td>
</tr>
<tr>
<td>No intervention</td>
<td>2</td>
<td>11.8</td>
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<tr>
<td>Total</td>
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<td>100</td>
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<table>
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<th>Attended at follow up Clinic</th>
<th>Number</th>
<th>Percentage</th>
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<td>Yes</td>
<td>5</td>
<td>29.4</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>70.6</td>
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<tr>
<td>Total</td>
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<th>Police involvement</th>
<th>Number</th>
<th>Percentage</th>
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<tr>
<td>Yes</td>
<td>8</td>
<td>47.1</td>
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<tr>
<td>No</td>
<td>9</td>
<td>52.9</td>
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<tr>
<td>Total</td>
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Table 3: Assailant identification and place of assault

<table>
<thead>
<tr>
<th>Assailant identity</th>
<th>Number</th>
<th>Percentage</th>
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<td>Known</td>
<td>15</td>
<td>88.2</td>
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<tr>
<td>Not known</td>
<td>2</td>
<td>11.8</td>
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<tr>
<td>Total</td>
<td>17</td>
<td>100</td>
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<table>
<thead>
<tr>
<th>Place of assault</th>
<th>Number</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Homeroom</td>
<td>10</td>
<td>58.8</td>
</tr>
<tr>
<td>Uncompleted building</td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>Bush path</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td>Riverside</td>
<td>1</td>
<td>5.9</td>
</tr>
<tr>
<td>Not documented</td>
<td>2</td>
<td>11.8</td>
</tr>
<tr>
<td>Total</td>
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</table>

Table IV shows the type of injury sustained. Majority
of the patients (52.9%) do not have an obvious genital
injury while 23.5% of the patients had hymenallaceration
Table 4: Type of injury

<table>
<thead>
<tr>
<th>Type of injury</th>
<th>Number</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Vaginal laceration</td>
<td>2</td>
<td>11.8</td>
</tr>
<tr>
<td>Hymenal laceration</td>
<td>4</td>
<td>23.5</td>
</tr>
<tr>
<td>Perineal bruises</td>
<td>2</td>
<td>11.8</td>
</tr>
<tr>
<td>No obvious injury</td>
<td>9</td>
<td>52.9</td>
</tr>
<tr>
<td>Total</td>
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</table>

Discussion

The incidence of sexual assault during the study period was 2.3% of the total gynaecological admissions.

This incidence is similar to that reported in Calabar but higher than the figure from Addis Ababa of 0.6%. Incidences as high as 5% and 5% have also been reported. The low incidence in this study may be as a result of reluctance to report cases due to stigmatization. The age range of patients in this study was between 2-22 years and this was similar to findings in the study in Calabar with an age range of 4-23 years. In this study, 64.8% of the victims were below 12 years and this is in keeping a study done by Olusanya et al in Benin City, while the mean age of victims in Ethiopia is 9.5 years. This age range is reported to constitute a risk factor of sexual assault as these victims are incapable of consenting of defending themselves against their assailants. The most common weapon by assailant was knife (17.6%). ‘Charm’ was used in one of the cases documented but in majority of cases no weapon was used.

Late presentation for medical care was observed in this study. Less than half of the victims (47.1%) presented within 72 hours of sexual assault when post exposure prophylaxis will be beneficial. The median of the interval to presentation at the health facility in this study was 6 days as against 16 hours as reported by Hosenfeld et al. However, two victims presented after 2 months of sexual assault as a result of recurrent vaginal discharge.

Timketa et al showed a median length of time to presentation of 4 days with a range of 2 hours — 3 years. When the victim knows the assailant, the time used in reaching amicable settlement and the care of the victim at home may result in the delay in presentation. Also attempt at concealment of assault because of the associated stigmatization may be a factor in late presentation.

Majority of patients (88.2%) cleaned up their body before presentation at the hospital. This has significant negative effect on the availability of forensic evidence for prosecution of assailants. Retroviral screening was done in 29.4% of cases and they were all negative and had post exposure prophylaxis. Likewise, in a study done in Calabar, Nigeria, 27.3% of the victims had retroviral screening and none was positive. While Ige et al showed that 60% victims who had retroviral screening in their study were non-reactive, another study revealed that none of the 40% victims who presented within 24 hours of sexual assault had post exposure prophylaxis.

The victims' home was the place of assault in 58.8% of cases and this was higher than the 35% documented by Grossin et al in France. However, in a study done by Ekabue et al in Calabar, bush track was the commonest place of assault. In a study done in France, the assailants were members of the families in 58% of cases. In this study, 88.2% of the assailants were known to the victim or her family and may even be a member of the family. Most sexually active victims do not have genital injuries but may have other body injuries especially when the victim was forcibly held down. Genital injuries were noted in 47.1% of cases in this study and of these, hymenial laceration was the most common injury (23.5%). Vaginal laceration was present in 11.8% of the victims and the lacerations occurred in the posterior fornix, necessitating examination under anesthesia and repair. This cases requiring surgical repair was quite lower compared to 20% of surgically managed anogenital injury secondary to sexual assault in India. In Calabar, superficial abrasions, bruises and lacerations were observed in 54.6%.

Sexual assault remains one of the most problematic and controversial issues in law, medicine and in the society at large. Following the outcry against recent scandals, it has become even more important that medical, law enforcement, legal, social services and other professionals possess comprehensive knowledge on all issues pertaining to this subject. It is no longer enough to trust feelings or intuitions; experts in the field must present solid forensic evidence in a knowledgeable and authoritative manner.
References

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Ultrasonography as a non-invasive modality in demonstrating retinal detachment

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3Department of Radiology, Irrua Specialist Teaching Hospital, Irrua.

Abstract

Retinal detachment is a leading cause of blindness and this may be reversible depending on how early the diagnosis is made. In our environment the use of ultrasonography as a non-invasive modality of imaging the eye cannot be over emphasized, as it is very cheap and readily available.

Keywords: Retinal detachment, Ultrasonography, blindness.

Introduction

Retinal detachment is a common cause of blindness in our environment though there is no currently documented literature on its incidence in Nigeria. It may occur spontaneously or complicate a number of systemic or local ocular disorders1,2,3. Any age or sex may be affected.

Before the advent of ultrasonography, fundoscopy was used in detecting retinal detachment. However, in cases where the lens is opaque as in cataract or there are vitreous/aqueous opacities such as haemorrhages, fundoscopy becomes impossible in visualizing the retina. With the introduction of ocular ultrasonography or echography, this difficulty has been overcome.

The following are 2 cases of retinal detachment presented because of their classical ultrasonographic features.

Case One

Mr. A.S. a 67 year old man reported to the ophthalmology clinic on the 28th of May 2004 with a history of inability to see at all. He was apparently well until sometime in 1997 when he developed gradual onset of poor vision. There was no history of pain in his eyes, eye discharge or headache. He began to apply various eye drops to his eyes with no improvement. About a year later, he discovered he could no longer see with the left eye. He then reported to a private clinic where he was diagnosed to have bilateral cataracts, although ocular ultrasound was not done. He was subsequently put on surgery list for extraction in December 2000 but due to technical factors, the surgery was not done. He was noticed further deterioration in his ability to see with the right eye until he became totally blind. Mr. A.S. was a farmer until he lost his sight. He is not a known diabetic or hypertensive. He is married to 2 wives and has 8 children alive. There is no family history of blindness or poor vision. He takes alcoholic drinks occasionally but does not smoke cigarette.

On examination, he was found to be totally blind with no light response in both eyes. He was also found to have bilateral mature cataracts. His pulse was 70 beats/min, temperature 36.5°C. Blood pressure was 140/80 mmHg. His chest and abdomen were normal. Fundoscopy was not done, however intraocular pressures were elevated bilaterally. A provisional diagnosis of bilateral mature cataract was made. Ocular ultrasonography was requested. This revealed
bilateral linear echogenic immobile strands within the vitreous chamber extending from the ora serratae anteriorly to the optic nerve head posteriorly in a Y-shaped pattern (Fig. 1). Both lenses were also seen to have echogenic debris within and around them. The aqueous humor, optic nerve and retrobulbar structures appeared normal bilaterally. There was no evidence of subretinal masses or vitreous hemorrhages. A diagnosis of bilateral mature cataracts and bilateral total retinal detachment was made. The cause of the retinal detachment was attributed to his longstanding glaucoma. His planned surgery was cancelled and he is presently undergoing rehabilitation because long standing retinal detachment has no cure.

On examination she was found to be totally blind in her right eye with no light response. The left eye was normal. Her pulse was 80 beats/min. Temperature 36.4°C. Blood pressure 140/80 mmHg. Chest and abdomen were normal. Fundoscopy revealed a pale right retina. A provisional diagnosis of optic neuritis to rule out retinal detachment was made. Ocular ultrasound scan was then ordered. This revealed a mobile v-shaped linear echogenic strand within the right vitreous chamber with attachment of the apex to the optic nerve head (Fig. 2). The limbs of the V extended as far anteriorly as the ora serrata. The lens, optic nerve, aqueous humor and retrobulbar structures were normal. The left eye globe and its contents were also normal. A diagnosis of left sided retinal detachment was made, most likely recent. She was referred for retinal re-attachment in a center where the facility is available.

Retinal detachment occurs when the sensory retina becomes separated from the retinal pigment epithelium (RPE). The retinal pigment epithelium has a barrier function and if the barrier is damaged, fluid leaks into the potential subretinal space. A retinal detachment caused by a hole, tear or break in the retina is referred to as a rhegmatogenous retinal detachment. Non-rhegmatogenous retinal detachment is secondary to ocular diseases such as fibroproliferative disease like vitreoretinopathy of prematurity or vitreoretinopathy of diabetes. Other causes include inflammatory exudative processes like endophthalmitis, coat’s disease, trauma, lesions of the choroid, senile macular degeneration, persistent hyperplastic primary vitreous (PHPV) and

Case Two

Mrs. E.P. is a 47 year old woman, a known myopic patient who has been attending the ophthalmology clinic regularly for routine periodic refraction even though she has not been using her lenses regularly as prescribed. She presented on the 1st of May 2004 with a one week history of inability to see with her right eye even when she puts on her glasses. There was no history of pain in the said eye or discharge. There was no headache or history of trauma to her eye. She denies ever applying any medication to her eyes. She is not a known diabetic, hypertensive or glaucoma patient. She is married in a monogamous setting with five children. There is no family history of blindness. She takes alcoholic drinks occasionally but does not smoke cigarette. A previous routine scan she did 3 months before showed normal findings. The power of her corrective lenses were – 4 diopters for the right and – 3 diopters for the left.
intraocular masses especially those which lead to traction on the retina. High myopia and vascular insufficiency have also been implicated. Retinal detachment could be partial or total. Our observation in University of Benin Teaching Hospital is that ocular trauma, high myopia, glaucoma and cataract extraction were more frequent risk factors in the development of retinal detachment. High myopia and glaucoma were the cause of retinal detachment in the second and first cases presented respectively.

The retina is the light sensitive layer of the globe which commences anteriorly at the ora serrata and lines the innermost part of the globe. It is adherent to the choroids. When the retina becomes detached, it appears as a curvilinear strand which is fixed anteriorly at the ora serrata and posteriorly it is tethered to the optic disc (papilla). It therefore assumes a V or Y shaped configuration within the vitreous humor. This is the pattern of a total retinal detachment. On the contrary, a partial detachment occurs in only one quadrant. Absence of mobility and a thick folded retina signifies a long standing detachment. The first patient presented showed a Y-shaped total retinal detachment with absence of mobility which suggested a long standing detachment, however the second case showed a V-shaped total retinal detachment which was mobile indicating a recent occurrence.

There is variation in the incidence of retinal detachment. A study by Polkinghorne et al in New Zealand found an annual incidence of rhegmatogenous retinal detachment to be 11.8 cases per 100,000 people with a mean age of 53.9 years and a higher male preponderance (ratio 1.3:1). Ocular trauma, high myopia and cataract extraction were found to be significant risk factors in the development of rhegmatogenous retinal detachment. Though the exact prevalence of retinal detachment in Nigeria is not known, a local study in Benin City by Ukpomwan et al of 39 patients with ocular disorders using ultrasonography confirmed retinal detachment in 21 of them (53.85%). This local study did not, however, state whether the form of retinal detachment found was rhegmatogenous or non–rhegmatogenous.

Ultrasonography is the primary radiologic modality for investigating suspected retinal detachment especially when fundoscopy cannot be done because of opacity of the lens. Mr. A.S. could not have fundoscopy because of bilateral opaque lenses (cataract). It is a very safe, cheap and readily available technique which uses non-ionizing sound waves. Ultrasonography with a high frequency curvilinear probe is invaluable because apart from confirming the diagnosis of retinal detachment, it may also demonstrate the cause of the detachment. For example, intraocular pathologies such as coats disease (Retinal telangiectasia), choroidal melanoma and vitreous hemorrhages are well demonstrated by ultrasonography. On ultrasonography, a totally detached retina appears as echogenic strands in the vitreous chamber with attachment posteriorly at the optic disc and anteriorly at both ora serrata. This may assume a V or Y shaped configuration as was seen in the two cases presented. Both cases had B–mode real time ocular ultrasonography which confirmed total retinal detachment.

Contrast enhanced colour Doppler ultrasound is a recently introduced modality which can also be used in evaluation of the eye. It is particularly useful in differentiating retinal detachment from vitreous membranes. Han et al compared the accuracy and efficacy of the various conventional ultrasound modalities (gray – scale versus color Doppler versus Power Doppler) in evaluating 32 eyes with retinal detachment and vitreous membranes and obtained the following diagnostic accuracy: 78% with gray – scale ultrasound, 81% with color Doppler ultrasound and 59% with power Doppler ultrasound. A similar study by Wu et al of 82 cases of intraocular diseases using color Doppler ultrasonography helped to differentiate retinal detachment from other ocular diseases such as vitreous haemorrhage and membranes, tumours and persistent hyperplastic primary vitreous. These techniques were not utilized in evaluating the two cases under discussion.

Magnetic resonance imaging and computed tomography may also be used to demonstrate a detached retina, but these modalities are expensive with computed tomography delivering a high radiation dose to the eyes. Though magnetic resonance imaging does not use ionizing radiation, it is not readily available and it is more expensive than computed tomography. The appearance of retinal detachment will depend on whether axial or coronal scans are done. Coronal scans show a characteristic folding membrane...
in the vitreous chamber while axial scans show a homogenous V shaped increased density or signal intensity while using computed tomography and magnetic resonance imaging respectively. However, in many cases, magnetic resonance imaging and computed tomography will not detect a detached retina, in such cases ultrasonography is a superior imaging modality. Magnetic resonance imaging and computed tomography were not done for the two cases presented. Laser or cryotherapy is used to seal up retinal tears and re-establish contact between the detached retina and the retinal base. This is only successful when retinal detachment is fresh and there are no contraindication for its re-attachment. The second patient is amenable to surgery for retinal reattachment.

Choroidal detachment, vitreous hemorrhages, retinoschisis, posterior vitreous detachment and foreign body within the vitreous chamber are some disorders which may simulate retinal detachment. A detached choroid appears as curvilinear echogenic strands within the vitreous chamber which does not show any point of attachment to the optic disk or ora serrata. Vitreous bleeds appear as hyperechoic strands which float freely within the vitreous without attachment to any structure. An avulsed retinal vessel may mimic tractional retinal detachment on echography especially if the eye is not scanned in both longitudinal and transverse planes. Scott et al reported a 57 year old diabetic woman who presented with a non-clearing vitreous haemorrhage of 2 months duration in the left eye. Echography was consistent with a localized traction retinal detachment on longitudinal planes, however, transverse planes demonstrated a pinpoint opacity in the vitreous chamber which was only confirmed at surgery to be an avulsed retinal vessel. The report therefore stresses the importance of scanning any eye in 2 planes to avoid errors of interpretation.

Echogenic foreign bodies usually show a more bizarre appearance depending on its shape, and this is commonly associated with a distorted globe and a dislocated lens.

Radiologic differentiation of these entities from retinal detachment is easy especially with a good history and clinical evaluation.

Conclusion

Two cases of retinal detachment are presented. The appearance on ultrasonography is described. Ultrasonography is a cost effective modality of evaluating ocular or visual field disorders in order to detect retinal detachment which when detected early can be re-attached surgically.

References