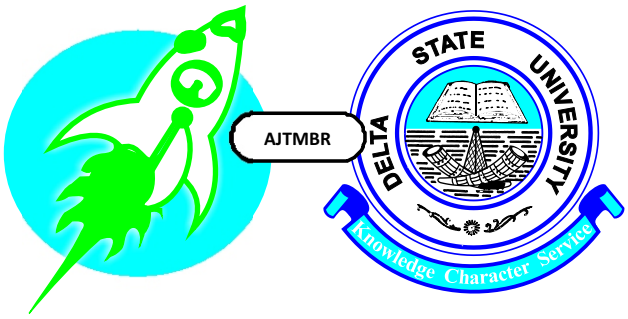
African Journal of Tropical Medicine and Biomedical Research (AJTMBR)



The Journal is the Official Publication of the College of Health Sciences, Delta State University, Abraka, Nigeria.

ISSN: 2141-6397

Focus and Scope

The *African Journal of Tropical Medicine and Biomedical Research* is a multidisciplinary and international journal published by the College of Health Sciences, Delta State University of Abraka, Nigeria. It provides a forum for Authors working in Africa to share their research findings on all aspects of Tropical Medicine and Biomedical Sciences and to disseminate innovative, relevant and useful information on tropical medicine and biomedical sciences throughout the continent. The journal will publish original research articles, reviews, editorials, commentaries, short reports, case reports and letters to the editor. Articles are welcome in all branches of medicine and dentistry including basic sciences (anatomy, biochemistry, physiology, pharmacology, psychology, nursing etc) and clinical sciences (internal medicine, surgery, obstetrics and gynaecology, dental surgery, child health, laboratory sciences, radiology, community medicine, etc). Articles are also welcome from social science researchers that document the intermediating and background social factors influencing health in countries of Africa. Priority will be given to publication of articles that describe the application of the principles of primary health care in the prevention and treatment of diseases.

Editorial Notices

The journal will be published biannually in the months of March and September. Annual subscription fee in Nigeria is two thousand naira (N2,000) per volume (2 issues); Five hundred naira single copy (N500). The annual subscription rate for other parts of the world is as follows: United Kingdom £60 (post free). West Africa $60 (post free). The rest of the World and the United States of America $120 (post free). A charge of $60 is made for reprints inclusive of postage. Cheques should made playable to the African Journal of Tropical Medicine and Biomedical Research and addressed to the Editor-in-Chief.

Journal Contact

All correspondence, including manuscripts for publication (in triplicate) should be addressed to:

Professor P.S. Igbigbi
The Editor-in-Chief,
Department of Anatomy,
Faculty of Basic Medical Sciences,
College of Health Sciences,
Delta State University,
Abraka, Delta State,
Nigeria.

Or**:**
Dr Lawrence Omo-Aghoja
Editor
Department of Obstetrics and Gynecology,
Faculty of Clinical Medicine,
Delta State University,
Abraka, Nigeria.
Email: journal_ajtmbr@yahoo.com
Cc: all email to
eguono_2000@yahoo.com
Tel: 08039377043

All authors are advised to submit an electronic copy in CD-ROM along with a hard copy of their manuscript, as this will spare remarkable time in the reviewing and typesetting processes.

In the alternative, authors can submit their articles and covering letter by email attachments. A covering letter (signed by all authors) accompanying the manuscript should certify that the article has not been previously published and is not being considered for publication elsewhere.

Information for Authors

All manuscript are peer-reviewed and accepted with the understanding that the work has not been published or being considered for publication elsewhere. Indeed the authors would be requested to sign a copyright form transferring the ownership of

the paper to the *African Journal of Tropical Medicine and Biomedical Research*. All articles must include the correct names and addresses of author(s) including e-mail addresses and telephone numbers. Articles will be subjected to a thorough peer review process before any decision is made to publish or not. Authors should note that the *African Journal of Tropical Medicine and Biomedical Research* is not under any obligation to publish articles submitted, as decision to publish will be based on recommendations of reviewers and the editorial advisory board.

Manuscripts

Articles submitted for publication should be typed double-spaced with 2.5cm margins with accompanying CD-ROM in Microsoft Word format for easy and quick peer review and typesetting. Each of the following sections should begin in a new page: title page, abstract, introduction, materials and methods, results, discussion, acknowledgment (s), references, tables, legends to figures and illustrations. The manuscript should include:

Title Page

The title page should include the following information: 1. the title and sub-title; 2. the name(s) of the author(s); 3. the affiliation(s) of the author(s); 4. name and address of the corresponding author and 5. three to six key words for indexing and retrieval purposes.

Abstract

The abstract should be structured and not more than 250 words. It should carry the following headings: *Introduction, Materials and Methods, Results and Conclusion.*

Original Research - The journal welcomes articles reporting on original research, including both quantitative and qualitative studies. Full-length articles should generally not exceed 3000 words, excluding abstract, tables, figures, and references. The subject matter should be organised under appropriate headings and sub-headings as itemized above.

Review Articles - Comprehensive review articles on all aspects of tropical medicine and biomedical sciences will also be considered for publication in the journal. Reviews should provide a thorough overview of the topic and should incorporate the most current research. The length of review articles must not exceed 3,000 words and the organisational headings and sub-headings used are at the author's discretion.

Short Reports - Brief descriptions of preliminary research findings or interesting case studies will be considered for publication as short reports. The length of the abstract and article should be restricted to 150 and 2,000 words respectively and organisation of short reports are left to the author's discretion.

Commentaries or Editorials - Commentaries or editorials on any aspect of tropical medicine and biomedical sciences in Africa will be considered for publication in the journal. Opinion pieces need not reference previous research, but rather reflect the opinions of the author(s). The length should not exceed 2,000 words.

Tables and Figures

All tables and figures should be submitted on separate sheets of paper and should be clearly labelled. Coloured tables and figures may be reprinted in black and white. Authors should especially take care that all tables are clear and understandable by themselves, independent of the text. A reader should be able to read only the tables and easily grasp all information without the text.

Acknowledgments

Acknowledgments should be included on a separate sheet of paper and should not exceed 100words. Funding sources should be noted here.

References

References should be in the Vancouver style and numbered consecutively in the order in which they are mentioned in the text. Titles of journals should be abbreviated according to the *Index Medicus* style. Authors must cross-check and make sure that all information provided in the reference list is complete and correctly written. Reference numbers should be inserted above the line on each occasion a reference is cited in the text, e.g., … as [1-3] reported in other studies . Numbered references should appear at the end of the article and should include the names and initials of all authors. The format of references should be as published by the International Committee of Medical Journal Editors in the British Medical Journal 1988, volume 296, pages 401-405. The following are sample references for an article published in a journal and for a book: Ahmed Y, Mwaba P, Chintu C, Grange JM, Ustianowski A, Zumla A. A study of maternal mortality at the University Teaching Hospital, Lusaka, Zambia: the emergence of tuberculosis as a major non-obstetric cause of maternal death. Int J Tuberc Lung Dis 1999; 3: 675-680. Whitby LG, Smith AF, Beckett GJ. Enzyme Tests in Diagnosis. In: Lecture Notes on Clinical Chemistry. Whitby LG, Smith AF & Beckett GJ$_{th}$ (eds). 4 edition. Blackwell Scientific Publications. 1988. 103-127.

Units of Measurement

All measurements should be expressed in SI (Systeme International) Units.

Galley proofs

Corrections of galley proofs should be strictly restricted to Printer's error only. Orders for offprints should be made when the corrected proofs are being returned by the authors. Articles accepted for publication remain the property of the journal and can only be reproduced elsewhere in line with section 5 of the copyright agreement.

Table of Contents

Editorial

Male Factor Infertility in Low Resource Settings: Diagnostic and Treatment Barriers

Omo-Aghoja LO

Email: eguono_2000@yahooo.com
Tel: +2348039377043

Keywords: *Male factor infertility, low resource settings, Diagnostic, Treatment, Barriers*

Correspondence: *Department of Obstetrics and Gynecology, Faculty of Clinical Medicine, College of Health Sciences, Delta State University, Abraka, Nigeria.*

Background

Male infertility refers to the inability of a male to achieve pregnancy in a fertile female. Hitherto in most part of the world particularly in Africa and other developing countries, women, bore the sole blame for barren marriages and took the psychosocial brunt; and in many areas infertility is a socially acceptable basis for divorce by the husband.[1-3] This may be due to the believe and inadequate knowledge and clear understanding existing in the sociocultural milieu of the couples. Male infertility is considered when identifiable female causes of infertility are excluded and semen quantity and quality fails to fulfill WHO criteria[4,5]

From available indices, Male factor infertility is quite common in developing nations and low resource settings accounting for 40-50% of infertility in humans,[6-8] and the most severe form of male infertility is that due to azoospermia which is present in 5% of investigated infertile couples[9], this is against the backdrop of the fact that socio-culturally this is down played in most of these settings even in face of clear evidence that the male may be sole cause of the infertility.[1,2,3] Indeed in some settings the concealment of the male factor may lead to family members coercing the women to having sexual intercourse with a brother or other male relations of the husband to get her pregnant on behalf of the husband. This sociocultural perspectives no doubt significantly impacts on the incidence of male infertility which may indeed be higher than the currently quoted figures and the treatment outcomes for those established cases, as compliance and follow-up of treatment is usually poor on the part of the males. The fact that males of infertile couples may not present for evaluation and seminal
fluid analysis, continue to give relevance to the SIMs Huhner's test in developing countries/low resource settings.[10,11]

Beyond the socio-cultural impediments that continue to remain a major challenge to the management of male infertility in developing countries and low resource settings, availability and affordability of investigations for male infertility, treatment facilities and expertise for management remains poor.

Discussion

There is paucity of health care facilities with the requisite needs for handling male infertility. Largely, the primary and secondary healthcare facilities that are closer to the greater majority of the inhabitants of low ary

resource settings in these nations are devoid of these management needs. The tertiary health care facilities with laboratories where some of the modalities for investigation such as the seminal fluid analysis and the presence of a Gynecologist may not be accessible and affordable by a larger proportion of couples with male factor infertility. They may be discouraged by the distance from their place of residence, lack of affordable means of transportation and the often prohibitive cost of treatment.

Hormone assays, facilities for genetic studies including karyotyping, testicular ultrasonography, vasogram and testicular biopsy are usually not readily available even in tertiary centers in most developing countries and low resource settings. Where they are available, they may not be readily accessed or afforded by the clients suffering male infertility for reason of cost as most patients with this condition are usually poor and there is no support for management of patients with infertility in countries of the globe.[23,13]

Again the needed experts for the full complements of investigations and treatment modalities such as a geneticist and urologists are usually not readily available even in tertiary heath care facilities in developing countries. This further accentuates the difficulty to access the only few distant centers from the abode of clients with male factor infertility and the cost becomes usually more prohibitive because of paucity in face of high demand.

Poor health seeking behavior of citizens of most developing nations also challenges male factor infertility. Some infertile couples often consult spiritual homes, herbalists, traditional healers before going to hospital. This is because of perceived spiritual causes of infertility. When they finally present to orthodox practitioners, they tend to move from one practitioner to another. Sometimes they go back to traditional healers because of the high cost of investigations and treatment for infertility.[10,11]

Continuous search for treatment of male infertility particularly the variants with etiological consideration being testicular factors (which are not readily amenable to conventional therapy), led to the discovery of in-vitro fertilization (IVF) and other assisted conception techniques. This option is very expensive and not readily accessible in developing countries. Extremely few public health care facilities have units for IVF and assisted conception, rather it is mainly private sector driven. The cost even in the few public health care facilities is usually prohibitive and out of the reach of very many clients. The acceptability of IVF from lack of appropriate information, impediments based on cultural and religious perspectives is another major challenge faced by this treatment option and has in some instances limited its use even by some that could have afforded it.

Adoption still remains a viable option for some couples where all other options fail. However this is poorly utilized in most developing countries. There are yet no clear laws and guidelines for its practice in most developing nations. The practice is further challenged in low resource settings and developing countries by serious sociocultural resentment to it.[14]

Poor budgetary allocations and or non-implementation of the meager allocation to health in face of poor political commitments to health care needs are other serious challenges in low resource settings. This makes the health care facilities poorly equipped in terms of facilities and requisite personnel.[12] The case for infertility management is made worse because of the strong moral and ethical debate against funding of infertility management with public funds in most countries of the world including developing countries.[12]

Finally, a large proportion of the citizenry in developing nations live in resource poor settings where there are no access to health care facilities, and for those that even live close to the health care

facilities, they may not have the economic wherewithal to afford hospital care. Therefore poor personal and individual state of finance remains yet another major impediment and challenge to accessing health care facilities to seek treatment for male infertility. The policy of health care delivery in most developing countries is based on a "cash and carry" principle and in the face of ravaging poverty this will serve as a significant impediment.

Conclusion

In conclusion, male factor contributes significantly to infertility globally with developing nations worse hit with its effect. The diagnosis and treatment of male infertility in low resources settings is significantly bedeviled with a number of intermediating socio-cultural, religious, economic and political challenges. Using conventional methods and recent technologies are expensive and not readily available in these environments. It is therefore necessary for us to understand the various factors that contribute to male infertility in our environment so as to develop preventive strategies.

References

1. Singh, A.J. Support for infertile couples. World Health Forum 17:176-177(1996)
2. Leke, R.J.I. et al. Regional and geographic variations in infertility: Effects of environmental, cultural, and socioeconomic factors. Environmental Health Perspectives Supplement 101(Suppl. 2):73-80 (1993).
3. Yeboah, E.D. et al. Etiological factors of male infertility in Africa. International Journal of Fertility 37(5):300-307 (1992);
4. World Health Organization. WHO Laboratory manual for the examination and processing of human semen, 5 edition. Cambridge: Cambridge University Press, 2010;
5. Olooto, W.E. Infertility in male; risk factors, causes and management- A review J. Microbiol. Biotech. Res., 2012, 2 (4):641-645.
6. "Men's Health - Male Factor Infertility". University of Utah Health Sciences Center. 2003-04-01. Archived from the original on 2007-07-04. Retrieved 2007-11-21;
7. Brugh VM, Lipshultz LI (2004). "Male factor infertility". Medical Clinics of North America 88 (2) : 36785. doi :10.1016/S0025- 7125(03)00150-0; A
8. Hirsh. Male subfertility, BMJ, 2003, 327 (7416): 669672.
9. Irvine DS. Epidemiology and etiology of male infertility. Hum Reprod 1998; 13 (soppl 1): 33-44.
10. NwajiakuLA ,Mbachu II , Ikeako L. Prevalence, Clinical Pattern and Major Causes of Male Infertility in Nnewi, South East Nigeria: A Five Year Review. AFRIMEDIC Journal 2012; 3: 16-19;
11. Idrisa A. Infertility. In: Kwawukume EY, Emuveyan EE (Eds). Comprehensive Gynaecology in the tropics. Accra Graphic packaging, 2005:333-343
12. Oluyemi Akinloye and Ernest J Truter . A review of management of infertility in Nigeria: framing the ethics of a national health policy. Int J Womens Health. 2011; 3: 265275.
13. Philip Teg-Nefaah Tabong1 and Philip Baba Adongo2. Infertility and childlessness: a qualitative study of the experiences of infertile couples in Northern Ghana. BMC Pregnancy and Childbirth 2013, 13:72.
14. Oladokun A, Arulogun O, Oladokun R, Moharson-Bello IO, Bamgboye EA, Adewole IF et al. Acceptability of child Adoption as management option for infertility in Nigeria: Evidence from Focus Group Discussions. Afr. J. Reprod. Health 2009; 13 [1]: 79-91.

Acute Kidney Injury in Adult Nigerians: A Single Centre Experience

Okoye O, Ununigbe E, Ojogwu L.

ABSTRACT

Background: Acute Kidney Injury (AKI) is an abrupt and sustained rise in serum creatinine, urine output or both. It is associated with significant morbidity and mortality especially among hospitalised patients. Despite the poor outcome associated with the problem, data is lacking regarding the epidemiology of AKI in developing countries.

Objectives: To determine the incidence of AKI among medical admissions, to study the aetiological pattern, clinical presentation, complications and short-term outcome of the disease; and to determine the predictor of poor outcome among cases studied.

Methodology: This was a retrospective study. The case records of all cases of diagnosed AKI admitted into the medical wards for a period of 2 years was reviewed. AKI was regarded as sudden deterioration in renal function (azotaemia) with or without oliguria; and the absence of any evidence of chronicity.

Results: There were 2431 Medical admissions during the study period and of these, there were 33 cases of AKI with an incidence rate of 13.5 per 1000. Patients were aged 18-95 years with a mean age of 37.4±18.6 years. The commonest presenting symptoms were fever (64.5%), leg swelling (64.5%), vomiting (54.8%) and oliguria (61.2%). 77.4% patients had proteinuria, 64.5% were anaemic while 54.8% had elevated blood pressure. The commonest cause of AKI was Sepsis (45.1%). 61.2% had haemodialysis. Mortality rate was 41.9%. Not having haemodialysis was significantly associated with poor outcome.

Conclusion: AKI is associated with significant morbidity and mortality. Late presentation and delayed or lack of access to dialysis are major difficulties encountered.

Keywords: *Acute, Kidney Injury, Adult Nigerians*

Correspondence: *Okoye O, Nephrology Unit, Department of Medicine, University of Benin Teaching Hospital (UBTH),*

INTRODUCTION

Acute Kidney Injury (AKI) is a clinical syndrome with a myriad of causes; it is regarded as an abrupt and sustained rise in serum creatinine, urine output or both. Until recently there was no consensus definition of AKI; several published definitions are based on changes of serum creatinine and urine output. The two most recent and highly publicised consensus definitions and classification systems are the Acute Dialysis Quality Initiative's RIFLE[1] criteria and the Acute Kidney Injury Network (AKIN)[2] derived consensus definition. The RIFLE criteria stratify AKI into five groups: renal risk, renal injury, renal failure, renal loss and end stage renal disease (ESRD). This classification has been proposed to allow consistency across studies for greater ability to compare studies. The AKIN definition classifies AKI into three stages, basically discarding the last two stages of the RIFLE classification. There remains some variation in how the criteria are interpreted and used in literature, particularly with respect to the use of urine output criteria, the choice of baseline creatinine, and the use of the change in estimated glomerular filtration rate (GFR) rather than the change in creatinine[3].

The incidence of AKI varies according to the region / population studied i.e. community based, hospital based or intensive care unit (I.C.U.), and

also according to the definition of AKI used for a study. The Incidence is usually high in hospitals and even higher in ICU setting. This high incidence of hospital-acquired AKI is multifactorial; it has been related to an aging population with increased risks of ARF, the high prevalence of nephrotoxic exposures possibly in a hospital setting, and increasing severity of illness [4]. Recent studies in the United States [5,6] and Spain [7]have shown incidences varying between an average of 23.8 cases per 1000 discharges[5] with an increase from 61 to 288 per 100,000 population between 1988 and 2002 [6]. More recently, Ali *et al* reported a high incidence of 1811 cases of AKI per million population over a year[8].Among adult patients from South Africa, Seedat [9] reported an incidence of 20 cases per year per million population. Brazil[10]and North India[11] have a yearly incidence of 7.9 cases per 1000 and 6.4 per 1000 hospital admissions respectively.

In Nigeria, Bamgboye et al reported 175 out of 500 dialysis patients seen in a hospital over a 10 year period [12]. Anochie et al reported an incidence of 11.7 cases of ARF per year among children seen in a hospital[13]. The epidemiology of AKI in developing countries differs from developed worlds; while AKI is prevalent amongst the elderly in developed countries it is particularly commoner in children and young adults in developing countries. This may be a reflection of reduced lifespan in most developing countries, as well as a higher occurrence of infectious diseases in these regions and poor access to basic health care especially in rural and remote areas.

The aetiology of AKI depends on whether it is occurring in the general population (i.e. community acquired), hospitalised patients or critically ill patients in the ICU. A Spanish study[7] identified, acute on chronic renal failure, acute tubular necrosis (ATN), acute glomerulonephritis (AGN) acute interstitial nephritis (AIN), obstructive uropathy, vasculitis amongst others, as the commonest causes of community acquired AKI. Other rare causes are rhabdomyolysis in casualties from massive disasters after earthquakes, or crush injuries. The major causes of hospital-acquired ARF are ischaemic and /or toxin induced ATN, but often the cause is multifactorial and iatrogenic.

Acute renal failure occurs in up to 30% of all ICU admissions and is usually a manifestation of a multiorgan failure syndrome [14]. Common causes of AKI in ICU patients include severe sepsis and septic shock, which has been associated with almost 70% mortality [15]. Volume responsive AKI typically from blood/fluid loss is also common.

AKI is generally viewed as a potentially reversible and benign form of kidney disease compared to CKD, however it may be associated with long term kidney damage and some forms such as sepsis induced AKI is associated with significant morbidity and mortality; of concern is that volume responsive AKI is also associated with significant morbidity and mortality especially in some developing countries due to poverty, illiteracy, harmful customs/ traditional practices and poor access to health care.

Cases of community acquired AKI in developing countries typically present to hospitals late with florid clinical features, this challenges the usefulness of the RIFLE classification and often times leaves no room for adequate care. Despite the poor outcome associated with the problem, data is lacking regarding the epidemiology of AKI in developing countries.

This retrospective observational study sets out to determine the burden of AKI in a tertiary hospital and to study the general pattern of clinical presentation, aetiology, complication and outcome of patients with AKI. The data generated will help in planning targeted health education for communities and improving hospital care.

METHODS

Sampling procedure: UBTH is located in Benin City the capital of Edo State in South-South region of Nigeria with about 400 bed spaces. A register of all cases admitted into the medical wards from August 2007-Sept 2009 were obtained from which the data of all cases of AKI were collated. Information on their socio-demographic, clinical, laboratory findings and

management were obtained. The diagnosis of AKI was made based on a history of sudden onset, sustained oliguria and/or a serum creatinine rise; the absence of evidence to suggest chronicity such as a history >3 months, previous history of renal insufficiency, clinical signs, laboratory and radiological features suggesting Chronic kidney disease (CKD).

Statistical Method: Data entry and management were performed using SPSS statistical software package version 16(SPSS, inc., Chigago, IL). The demographic characteristics, health status and biochemical measurement (i.e. random blood sugar and serum creatinine) of the sample were presented as tables. Data were presented as mean SD for continuous variables and as frequency and percentages for categorical variables.

The main statistical analysis involved the estimation of the crude incidence rates of acute kidney injury for the sample. All p values < 0.05 was regarded as significant and marked with asterisks within tables for ease of recognition. The unadjusted odds ratio (OR) between exposure variables such as, sex, hypertension, sepsis, uraemic encephalopathy, dialysis, and the patient outcome (mortality) was determined by logistic regression analysis.

RESULTS: Out of 2431 medical admissions admitted in the 2 year period, 33 cases had confirmed AKI giving an incidence rate of 13.6 per 1000. Mean age was 37.4±18.6 years with a male to female ratio of 1.2:1. Majority of the patients (74.2%) were in the young age group (Table 1).

Table 1: Age and Sex Distribution of patients

Age group (years)	Male n(%)	Female n(%)	Total n(%)
18-44	12 (38.7)	11 (35.5)	23 (74.2)
45-64	2 (6.4)	0 (0.0)	2 (6.4)
≥65	3 (9.7)	3 (9.7)	6 (19.4)
Total	17 (54.8)	14 (45.2)	31 (100.0)

The commonest clinical presentations included proteinuria (77.4%), anaemia (64.5%), leg swelling (64.5%) and fever (64.5%). Hypertension was seen in 54.8% of cases while 6.4% had Gallop Rhythm suggesting heart failure (see Table 2).

Mean urea was 216±77.7 mg/dl, creatinine 6.2±3.5 mg/dl, potassium 4.8±1.0mmol/L and bicarbonate 16.4± 6.9mmol/L (table 2). The commonest causes of AKI were sepsis (45.1%), Acute glomerulonephritis (22.5%), hypovolaemia (16.1%) and Toxic nephropathy (9.6%) as shown in figure 1.

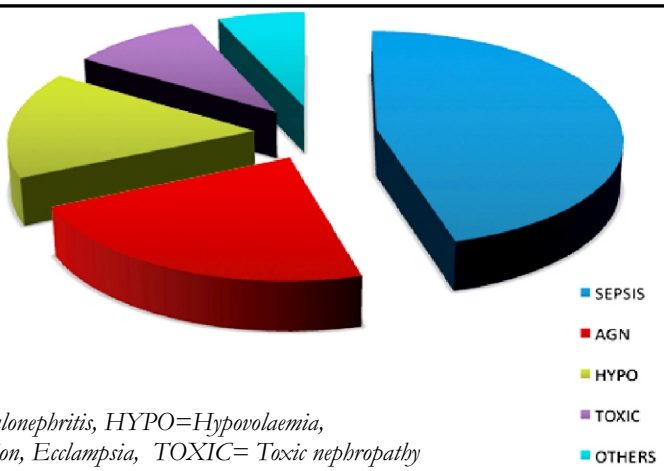
Nineteen out of the 31 cases (61.4%) had haemodialysis. Indications for dialysis were severe azotaemia, encephalopathy, acute pulmonary oedema, gastritis and pericarditis.

Mortality rate was 41.9% (n=13), only 5 of these patients dialysed before death, while 3 died within 24 hours of admission. Specific mortality rate among patients with sepsis induced AKI was 42.8% (6 out of 14). Mean duration of hospital stay among patients who died compared to discharged patients was 5.7± 4.7 and 15.4± 7.8 days respectively

Table 2: Frequency distribution showing patient clinical presentations

Symptoms	Frequency n(%)
Fever	20 (64.5)
Leg swelling	20 (64.5)
Oliguria	19 (61.2)
Vomiting	17 (54.8)
Irrational talk	8 (25.8)
Facial swelling	6 (19.3)
Seizures	5 (16.1)
Breathlessness	3 (9.6)
SIGNS	
Proteinuria	24 (77.4)
Pallor	20 (64.5)
Tachycardia	19 (61.2)
Haematuria	18 (58.0)
Hypertension	17 (54.8)
Crackles	6 (19.3)
Ascites	6 (19.6)
Epigastric tenderness	4 (12.9)
Asterixis	3 (9.6)
Pericardial rub	2 (6.4)
Gallop rhythm	2 (6.4)
Coma	1 (3.2)

Figure 1: Pie chart showing the main aetiologies of Acute Kidney injury



AGN= Acute glomerulonephritis, HYPO=Hypovolaemia, OTHERS= Obstruction, Ecclampsia, TOXIC= Toxic nephropathy

Table 2: Primary focus of Sepsis.

Focus of sepsis	Frequency (n)
Unknown	4
UTI	3
Pneumonia	2
Leg ulcer	1
GIT	1
Meningitis	1
Post-op sepsis	1
Post-abortal sepsis	1
TOTAL	**14**

Table 3: Laboratory findings of patients.

Parameter	Mean ± SD
Serum creatinine (mg/dl)	6.2 ± 3.5
Potassium (mmol/L)	4.8 ± 1.0
Urea (mg/dl)	216.6 ± 77.7
Bicarbonate (mmol/L)	16.4 ± 6.9
Packed cell volume (%)	28.0 ± 8.7

Table 4: Predictors of Mortality

	Odds Ratio	Confidence Interval (CI)	P value
Dialysis	7.04	1.26-39.32	0.026
Sepsis	0.91	0.16-5.19	0.919
Anaemia	2.27	0.32-15.6	0.407
Hypertension	0.65	0.10-3.89	0.641
Encephalopathy	0.99	0.18-5.27	0.993

DISCUSSION:

The incidence rate of 13.6 per 1000 reported in this study does not differ widely from available data in developing countries [10, 11]. Anochie et al [13] reported an incidence rate of 11.7 per 1000 among children. It is difficult to compare data from studies due to the varying study techniques; e.g. the definition of AKI applied in studies vary, and until recently there was no consensus definition of AKI. Again the incidence rate varies according to the population studied. However one can safely infer that the incidence rate has generally remained stable.

Peculiar to developing countries is the fact that kidney disease appears to be commoner in the young compared to the elderly [16]. This study shows that affected patients where mainly young-middle aged adults. The reason for this may be the high rate of untreated and poorly treated infections among this age-group and the high rate of sepsis induced AKI (40%) compared to other causes of AKI among patients studied confirms this.

Surprisingly, anaemia was very common among the patients (64.%). Anaemia used to be a distinguishing clinical symptom between AKI and chronic kidney disease but it seems that sepsis being a prominent cause of AKI is contributing to the anaemia. Furthermore erythropoietin insufficiency and blood loss precipitating AKI are other factors to be considered[17]. Nutritional anaemia is also generally common in most disadvantaged populations.

All patients studied were uraemic with florid symptoms. This stems from the problem of late diagnosis and referral of patients with AKI. In developing countries community acquired AKI is common and most patients often present late to health facilities due to ignorance and poverty, this is further compounded by failure of clinicians to diagnose the disease early and refer patients for specialised care. The RIFLE classification[1] of AKI was meant to help clinicians detect early signs of acute renal impairment however this is more useful in hospitalized patients who are at risk e.g. post-surgery and ICU admitted patients.

The importance of prompt renal replacement therapy in the setting of persistent symptomatic AKI cannot be over emphasized. This study revealed that not having haemodialysis was significantly associated with patient mortality and patients who died spent less than 5 days in hospital before their demise, some within 24hours. This again confirms the severity of patient's clinical presentation that often times necessitates renal replacement. The high cost and paucity of renal replacement therapy in developing countries remains a problem. However not all cases of AKI would require dialysis if diagnosed early and some cases especially sepsis-induced AKI are associated with high mortality regardless.

Conclusion

AKI is common among medical admissions and is associated with significant morbidity and mortality. Sepsis induced AKI is the commonest and most severe cause of AKI among patients studies. Prevalence of anaemia is very high amongst AKI patients. Lack of access to dialysis is a significant predictor of mortality. Early referral of all suspected cases of AKI to nephrologists for prompt management remains highly recommended.

Our limitation was restricting this study to only medical admissions thereby excluding AKI patients in the ICU and other ward such as the Obstetrics and Gynaecology wards. The reason was to make collation of records less cumbersome and avoid the logistics that would have been involved to pool such data. However obstetricians and surgeons referred some of the patients in this study.

REFERENCES

1. Uchino S, Bellomo R, Goldsmith D, Bates S, Ronco C. An assessment of the RIFLE criteria for acute renal failure in hospitalized patients. *Crit Care Med.* Jul 2006; 34(7): 1913-7.
2. Ostermann M, Chang RW. Acute kidney injury in the intensive care unit according to RIFLE. *Crit Care Med.* Aug 2007; 35 (8): 1837-43; quiz 1852.
3. Bagshaw SM, George C, Dinu I, Bellomo

R. A multi-centre evaluation of the RIFLE criteria for early acute kidney injury in critically ill patients. *Nephrol Dial Transplant*. Apr 2008; 23(4): 1203-10.
4. Thadhani R, Pascual M, Bonventre JV. Acute renal failure. *N Engl J Med*. 1996;334:1448-1460
5. Xue JL, Daniels F, Star RA, Kimmel PL, Eggers PW, Molitoris BA, Himmelfarb J, Collins AJ: Incidence and mortality of acute renal failure in Medicare beneficiaries, 1992 to 2001. *J Am Soc Nephrol* 17: 11351142, 2006.
6. Waikar SS, Curhan GC, Wald R, McCarthy EP, Chertow GM: Declining mortality in patients with acute renal failure, 1988 to 2002. *J Am Soc Nephrol* 17: 11431150, 2006.
7. Liano F, Pascual J: Epidemiology of acute renal failure: A prospective, multicenter, community-based study. Madrid Acute Renal Failure Study Group. *Kidney Int* 50: 811818, 1996
8. Ali T, Khan I, Simpson W, Prescott G, Townend J, Smith W, Macleod A: Incidence and outcomes in acute kidney injury: A comprehensive population-based study. *J Am Soc Nephrol* 18: 12921298, 2007
9. Seedat YK, Nathoo BC: Acute renal failure in blacks and Indians in South Africa: Comparison after 10 years. *Nephron* 64: 198201, 1993
10. Noronha IL, Schor N, Coelho SN, Jorgetti V, Roma˜O et al. Nephrology, dialysis and transplantation in Brazil. *Nephrol Dial Transplant* 12: 22342243, 1997
11. Jha V, Chugh KS: Acute renal failure in the tropics. *J Assoc Physicians India Suppl* 2: 1823, 1997.
12. Bamgboye et al. Acute renal failure at LUTH: A 10 year review. Renal failure 1993;15(1): 77-80.
13. Anochie IC, Eke FU: Acute renal failure in Nigerian children: Port Harcourt experience. *Pediatr Nephrol* 20: 16101614, 2005.
14. Joannidis M, Metnitz PG: Epidemiology and natural history of acute renal failure in the ICU. Crit Care Clin. 2005; 21: 239-249.
15. Schrier RW, Wang W: Acute renal failure: A prospective multicentre, community-based study. Madrid Acute Renal failure study Group. Kidney Int. 1996; 50: 811-818.

Citation
This article should be cited as: "*Okoye O, Unuigbe E, Ojogwu L.* Acute Kidney Injury in Adult Nigerians: A Single Centre Experience. Afr. J. Trop. Med. & Biomed. Res 2014; 3 (1): 10-16".

Limb amputations at a Tertiary Hospital in the Developing World: A Look at Pattern and Indications

Bafor A , Akinyemi O**

ABSTRACT

Objectives: To determine the pattern of amputations in a tertiary centre.

Design: Retrospective.

Setting: Orthopaedic Department of the University of Benin Teaching Hospital, Benin City, Nigeria.

Patients: Two hundred and ten (210) Individuals who underwent limb amputations between January 2007 and December 2011.

Results: There were one hundred and forty nine (149) male and sixty one (61) female patients (71% and 29% respectively). The ages ranged from one year (1) to ninety years (90). The mean age at presentation was 42.33±19.96 (SEM = 1.378). Limb ischaemia, trauma and neoplasia made up 55.7%, 35.7% and 4.8% respectively of all cases analyzed. There were one hundred and fifty (150) lower limb amputations and sixty (60) upper limb amputations.

Conclusion: Limb Ischaemia is the commonest indication for amputations done at the University of Benin Teaching Hospital.

Keywords: *Limb amputation, trauma, gangrene*

Corresponding Author: *Bafor A *Orthopaedic Unit, Department of Orthopaedics and Trauma, UBTH [Email: anirebafor@yahoo.com]*

INTRODUCTION

Limb amputations represent one of the oldest types of surgical procedures performed and continue to be an important procedure performed in most surgical services with an estimated 185,000 performed worldwide every year[1,2].

The indications for limb amputations vary from life threatening conditions to conditions where improvement in body image and function are the only goals of treatment. There are varying reports on the pattern of amputations across the globe and even within the same sub-region. In some studies, trauma has been identified as the leading indication for amputations whereas peripheral vascular disease has been identified as the commonest indication for limb amputation in other studies[3-6].

This paper aims to look at limb amputations in a tertiary health care facility in the developing world, defining indications for amputations as well as patterns of presentation.

Patients and methods: this was a five year retrospective epidemiological study carried out in the orthopaedic unit of the department of Orthopaedics and Traumatology, University of Benin Teaching Hospital, Benin City, Nigeria. All patients who underwent limb amputations between January 2007 and December 2011 were

included in this study. Data extracted from clinical records included patient demographics, indication for amputation and level of amputation. Outcomes were not studied.

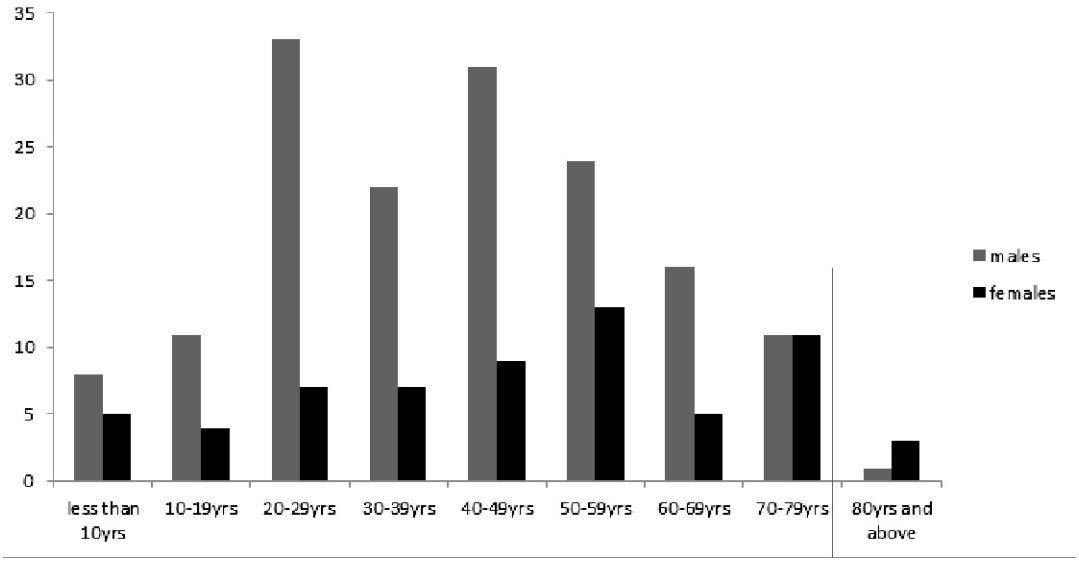
The study population was divided into upper limb amputations and lower limb amputations. The population was also divided into major and minor limb amputation using wrist and ankle as cut-off for definition of major/minor limb amputation[7].

Analysis was carried out using Microsoft excel statistical package with results obtained being expressed in tabular and graphical forms as deemed appropriate.

Range and standard error of mean were used to represent measures of dispersion and variance respectively, while measures of central tendency were represented by determination of mean where appropriate.

Results: A total of two hundred and ninety one (291) limb amputations were carried out during the study period but complete records were only obtainable for two hundred and ten (210) cases. This was made up of one hundred and forty nine (149) male patients and sixty one (61) female patients (71% and 29% for Male and female respectively). The ages ranged from one year (1) to ninety years (90). The mean age at presentation was 42.33±19.96 (SEM = 1.378). The age and sex distribution is represented in figure 1.

Fig 1. Bar Chart representing age and sex distribution



Limb ischaemia was the commonest indication for amputation making up 55.7% of all cases done. Trauma was the indication in 35.7% of cases done. The indications for amputations over the study period are represented in figure 2 and table 1. There were sixty (60) upper limb amputations and one hundred and fifty (150) lower limb amputations making up 28.6% and 71.4% respectively. During the study period, there were one hundred and fifty seven (157) major limb amputations and fifty three (53) minor amputations making up 74.8% and 25.2% respectively.

Fig 2. Pie chart representing indication for amputation

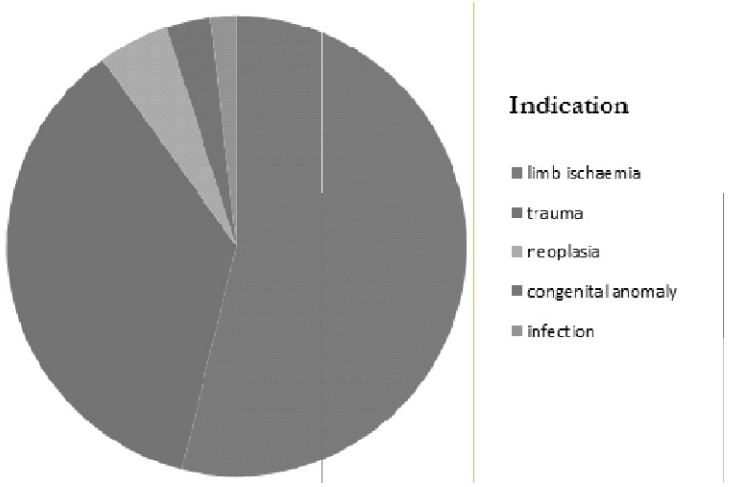


Table 1. Summary of results

	Frequency (N=210)	Percentage (%)
Age		
Less than 10 yrs	11	5.2
10-19yrs	15	7.1
20-29yrs	39	18.6
30-39yrs	26	12.4
40-49yrs	38	18.1
50-59yrs	34	16.2
60-69yrs	20	9.5
70-79yrs	23	11.0
80yrs and above	4	1.9
Sex		
Female	61	29.0
Male	149	71.0
Indication		
Limb ischaemia	117	55.7
Trauma	75	35.7
Neoplasia	10	4.8
Congenital anomaly	5	2.4
Infection	3	1.4
Position		
Left	99	47.1
Right	104	49.5
Bilateral	7	3.3

Discussion: Amputations represent one of the oldest and commonest procedures carried out in most orthopaedic services. It is a potentially disabling procedure which imparts on quality of life. It is no longer viewed purely as a salvage procedure, but as a form of treatment for some pathologies. The goals of amputation are to achieve speedy healing with resultant good functioning of the limb and early rehabilitation of the patient.

The indications for amputations range from complications of limb ischaemia, trauma, neoplasia or congenital limb deformities where function is better served by a prosthetic limb. It may also be a life saving procedure in cases of sepsis and has been indicated for even relatively rare conditions like mycetoma[8].

We found in this study that majority of patients present between the 3rd and 6th decades of life with the 3rd and 5th decades predominating. Another observation in this study is that amputations were almost three times as common in males when compared to females. This is similar to reports from Western Sudan, Saudi Arabia and Tanzania[8-10]. In particular, there was a male preponderance in the first seven decades of life whereas above 80yrs, there was a female preponderance. It is almost certain that, like with most medical conditions, the most likely aetiology will be the major determinant of the age and sex distribution of amputations in general. There has been a documented global increase in the incidence and prevalence of diabetes mellitus[11]. This fact, coupled with a higher incidence of smoking and vascular complications in males patients are possible reasons for this distribution.

Peripheral vascular disease with resulting ischaemia is thought to be the commonest cause of limb amputations in western countries. In western sudan, sepsis in patients with diabetic foot was the commonest indication for amputation[8]. In saudi Arabia, limb ischaemia was the commonest indication for amputation[9]. These findings are in keeping with results of this study which place complications of limb ischaemia as the leading indication for amputation in our environment. There have been contrary reports in the literature on the indications for amputations[12,13]. Thanni[6] et al in a nationwide review of indications for amputations in Nigeria determined that trauma was the commonest indication for amputation, accounting for 34% of all cases and peripheral vascular disease accounting for 14.4% (diabetic gangrene 12.3% and peripheral artery disease 2.1%). In particular, he determined that trauma was the more common indication in the southern part of Nigeria. The reason for the variation in patterns of indication is not clear. It is possible that an increase in the incidence and prevalence of diabetes mellitus coupled with poor compliance with medical management of this condition contributes significantly to the increased incidence of complications in these patients. Another possible explanation is a change in dietary pattern in our patients with the increasing 'westernization' in these parts. Trauma nevertheless, continues to be a significant indication for amputation, accounting for about a third of all cases seen in this series. Trauma is commoner in the first four decades of life and this may offer another possible reason for the observed disparity. In our study, the mean age at presentation was 42 years with less than half of patients presenting in the first four decades of life as against 33 years in the study by Thanni et al.

We also noted that limb amputations are more commonly done for lower limb pathology, an observation also noted by Chalya[10] et al.

Conclusion: The findings of this study conclude that limb ischaemia is the commonest indication for amputations carried out in the University of Benin Teaching Hospital, Benin City.

References:

1. Onubs O, Ediodiok E. The scope of amputation in developing world: a review of the literature. *Postgrad Doctor*. 1989;11:118-121.
2. Robinson KP. Historical aspects of amputation. Ann Roy Coll Surg Engl. 1991; 73: 134-136.
3. Ogeng'o JA, Obimbo MM, King'ori J.

Pattern of limb amputation in a Kenyan Rural hospital. Int Orthop (SICOT). 2009;33:1449-1453.
4. Olasinde AA, Oginni LM, Bankole JO, Adegbehingbe O, Oluwadiya KS. Indications for amputations in Ile Ife, Nigeria. *Niger J Med*. 2002;11(3):118-120.
5. Dada AA, Awoyomi BO. Is the trend of amputation in Nigeria changing? A review of 51 consecutive cases seen at Federal Medical Centre Ebute Metta, Lagos, Nigeria. Niger J Med 2012;51:167-169.]
6. Thanni LO, Tade AO (2007) Extremity amputation in Nigeria a review of indications and mortality. Surgeon 5:213-217
7. Paudel B, Shrestha,BK, Banskota,AK. Two faces of major lower limb amputations. Kathmandu Medical Journal. 2005; 3(3): 212-216
8. El Bushra Ahmed Doumi, Aisha Jabir Ali. Major limb amputations in El Obeid Hospital, Western Sudan Sudan JMS Vol. 2, No.4 , Dec. 2007. 237-239
9. Othman Maimani, Zohair Jamil Gazzaz, Mian Usman Farooq Amputations in a tertiary care hospital. Acta Medica Academica 2009;38:86-91]
10. Phillipo L Chalya, Joseph B Mabula, Ramesh M Dass, Isidori H Ngayomela, Alphonce B Chandika, Nkinda Mbelenge, Japhet M Gilyoma. Major limb amputations: A tertiary hospital experience in northwestern Tanzania. Journal of Orthopaedic Surgery and Research. 2012, 7:18 doi:10.1186/1749-799X-7-18.
11. Adeghate E, Schattner P, Dunn E. An Update on the etiology and epidemiology of diabetes mellitus. Ann N Y Acad Sci. 2006;1084: 1-29.
12. Akiode O, Shonubi AM, Musa A, Sule G. Major limb amputations: An audit of indications in a suburban surgical practice. J Natl Med Assoc 2005;97:74-78
13. Nwankwo OE, Katchy AU. Surgical limb amputation: A five year experience at Hilltop orthopaedic hospital, Enugu, Nigeria. Nigerian Journal of Orthopaedics and Trauma. 2004;3:139-149].

Citation
This article should be cited as: *"Bafor A, Akinyemi O. Limb amputations at a Tertiary Hospital in the developing world: A look at pattern and indications.* Afr. J. Trop. Med. & Biomed. Res 2014; 3 (1): 17-21".

Clinical Profile and Outcome of Adult Tetanus in Oghara, Delta State.

Obiabo Yo[1]

[1]*Department of Internal Medicine, College of Health Sciences, Delta State University, Abraka, Nigeria*

ABSTRACT

Background: Tetanus persists to be a global problem due to either failed immunization or poor coverage of many inaccessible populations in both developing and developed societies. Mortality is higher in the developing world with poorly organized health systems.
Aim: To report the clinical profile and outcome of tetanus admissions in Delta State University Teaching Hospital, Oghara, between June 2010 and April 2015.
Methods: The records of all patients managed for tetanus on the medical wards and the intensive care unit of the hospital were studied.

Results: Twenty-seven patients comprising of 21(77.8%) males and 6 (22.2%) females were diagnosed and managed for tetanus during the period under review. The mean age of the patients was 34.07±1.50 years.The patients were largely of low socioeconomic group. Lower extremity wounds and lesions was the commonest portal of entry,74.1%. The overall case fatality rate (CFR) was 37%. Among those managed in the intensive care unit the case fatality was 50%. The factors significantly associated with increased mortality include short incubation period (p =0.009), short onset time (p = 0.001), severity of the disease (p = 0.014) and increasing age (p = 0.03). The commonest complications recorded in this study were laryngeal and pharyngeal spasms, aspiration pneumonia and autonomic dysfunction.

Conclusion: Tetanus is life-threatening disease with high case fatality that is still a health challenge in our environment. There is need to provide better vaccination coverage for all including booster doses for adult males and to improve on medical intensive care facilities and training.

Keywords: *Clinical profile, outcome, Adult, Tetanus*

Correspondence: *Obiabo Yo*[1]*, Department of Internal Medicine, College of Health Sciences, Delta State University, Abraka , Nigeria*

INTRODUCTION

Tetanus is a preventable life threatening neurological disorder that constitutes a major public health challenge in developing countries. It is a cause of significant morbidity and mortality especially in developing countries. Despite several concerted efforts through immunization to contain this disorder, it persists as a global problem due to either failed immunization or poor coverage of many inaccessible populations in both developing and developed societies.[1]

Tetanus is caused by a neurotoxin produced by *Clostridium tetani,* a gram-positive, obligate anaerobic rod-shaped bacterium that forms spores. The spores are ubiquitous worldwide as constituents of soil and in the gastrointestinal tracts of humans and animals whose waste can contaminate many surfaces and substances. The spores are extremely difficult to destroy requiring autoclaving or prolonged exposure to iodine, hydrogen peroxide, formalin or gluteraldehyde.[2] The exotoxin, tetanospasmin, which is one of the most potent toxins ever known to man, with a minimum lethal dose of less than 2·5 ng/kg in humans[3] and absolute neurospecificity and enzymatic action,[4]is responsible for the clinical manifestations. The Clinical manifestations are

characterized by rigidity of muscles, painful muscle spasm, locked-jaw or trismus and clear mental status.

Unhygienic practices such as use of old or unsterilized razor blade for making tattoos, tribal marks, cutting umbilical cords; close contact of broken skin or wounds with soil and animal dung,; unsafe abortions, lack of active and passive immunization are the major risk factors.

This study described the clinical characteristics of adult tetanus in Delta State University Teaching hospital, Oghara, Nigeria.

MATERIALS AND METHODS

We retrospectively reviewed the records of all patients with tetanus admitted into the hospital and managed by the neurology unit of Delta State University Teaching Hospital, Oghara from June 2010 to April 2015. Tetanus was clinically diagnosed based on the presence of at least two of the following features trismus, risus sardonicus, painful spams and rigidity with or without opisthotonus. The demographic characteristics, portal of entry, incubation period, onset time, the severity, need for ventilator, duration of hospital stay, complications and outcome were obtained and analyzed. Incubation period was defined as the time interval in days between injury sustained and the first symptom or sign of tetanus. The onset-time was defined as the time interval in days between the first symptom and the first spasm. The disease was categorized based on severity using the Ablett's scoring system[5]. The outcome of the admission was categorized into discharged or dead. Autonomic dysfunction was diagnosed if there were two or more of: labile blood pressure (hypertension and hypotension), high grade fever in the absence of infection, tachycardia / bradycardia and diaphoresis in the absence of fever. The data was analyzed using statistical package for social sciences (SPSS) version 21

RESULTS

A total of 27cases were diagnosed and managed for tetanus out of 925 neurological admissions during the period under review giving a frequency of 2.92%. The patients comprised of 21 (77.80%) males and 6 (22.20%) females with a male to female ratio of 4.5: 1.0.*See table 1*.

Table 1: Age and Sex Distribution of Patients with Tetanus

AGE GROUP IN YEARS	</=20	21-30	31-40	41-50	51-60	>60	FREQ(%)
Males	3	6	8	0	2	2	21 (77.8)
Females	0	2	2	1	0	1	6(22.2%)
Total	3	8	10	1	2	3	27 (100%)

The mean age of the patients was 34.07±1.50 years with age range of 13years to 65 years. The mean age for males was 33.04±1.50 years and mean age for females was 37.67±1.52 years The patients were made up of artisans 9(33.3%), traders and business men and women 6(22.2%), farmers 4(14.8%), students 4(14.8%), civil servants 3(11.1%) and retired personnel 1(3.7%).

The portal of entry was puncture wounds and lacerations (including 2 cases of matchet cuts) in 24 (88.9%), diabetic foot ulcer was recorded in a patient(3.7%) and no obvious portal of entry was found in 2 patients (7.4%). Lower extremity lesions constitute portal of entry in 20 (74.1%) of cases.

The mean incubation period was 6.70±2.83 days with a range of 3 to 14 days. The mean

onset time was 2.04 ±0.85 days , ranging from 1 day to 4 days. Those who survived had longer incubation period of 7.6±3.1 days compared to those who died with incubation period of 5.2±1.3 days. The onset time was also shorter among those who died (1.2±0.42 days) compared to those who survived with onset time of 2.5±0.62 days. The mean dose of diazepam received was 216.2mg ±112.04mg per day. There was no significant difference between the mean dose received by those managed in the intensive care unit and those managed in the open ward p=0.234.

All the patients(100%) presented with lock-jaw and painful spasms while 25 (92.6%) had risus sardonicus. Rigidty with opisthotonus posturing was recorded in 22 (81.50%) and 20(74.10%) had board-like rigidity of the abdomen. *See table 2.*

The severity grading showed that none (0%) had mild tetanus, 4(14.8 %) had moderate, 9(33.3 %) had severe and 14(51.9%) had very severe tetanus. Generalised tetanus was present in 26(96.3%) and localized tetanus was seen in only one patient (3.7%). *See table 2.*

Table 2: Presenting Clinical Features & Complications of Tetanus among the Patients

Clinical features	Frequency	Percentage (%)
Portal of Entry		
Puncture wounds & lacerations	24	88.9
Diabetic foot ulcer	1	3.7
No obvious portal	2	74
Presenting symptoms & signs		
Trismus	27	100
Painful spasms	27	100
Neck rigidity&Opisthotonus	22	81.5
Risus Sardonicus	25	92.6
Abdominal rigidity (board like)	20	74.1
Complications		
Laryngeal/Pharyngeal Spasms	14	51.9
Aspiration pneumonia	11	40.7
Sepsis	5	18.5
Acute kidney injury	2	7.4
Autonomic dysfunction	8	29.6
DVT	1	3.7
Abllett's Severity grade		
I Mild	0	0
II Moderate	4	14.8
III Severe	9	33.3
IV Very Severe	14	51.9

DVT= Deep vein thrombosis

Out of the 27 patients 17 (63%) survived and were discharged home while 10 died constituting case fatality rate of 37%. The mean age for the survivors was 31.3±1.3years while the mean age for those who died was 38.6±1.7years. For those that were managed in the intensive unit, the case fatality rate was 50%. Out of the twenty-one patients who were managed in the emergency room or the wards there were 7 deaths with a case fatatilty rate of 33.3%. The cause of death of those who died in the emergency room or on the ward was mainly from respiratory failure secondary to laryngeal spasm.

The factors significantly associated with increased mortality included short incubation period less than 7 days (p =0.009), short onset time less than 2 days (p = 0.001) , severity of the disease (p = 0.014) and increasing age (p = 0.03). See table 3. Those with bad outcome tended to have shorter duration of hospital stay but there was no significant difference between severity of the disease and the duration of hospital stay (p = 0. 37) . Also there was no significant difference between the sexes with respect to outcome.

Table 3. Comparison of mean variables between outcomes

Variable	Discharges	Deaths	p-value
Age (years)	31.30±1.30	38.6±1.70	0.030
Incubation period (days)	7.60±3.10	5.20 ±1.30	0.009
Onset time	2.50±0.62	1.20±0.42	0.001
Duration of hospital stay	23.76±1.20	7.10±6.24	0.370

DISCUSSION

This study showed that despite concerted efforts to curb the burden of the disease through immunization coverage in the country, tetanus is still a cause of morbidity and mortality in Nigeria. Tetanus tend to occur in the younger working population in developing countries compared to the developed nations.[17] The mean age of occurrence in our study was 34.1±1.5 years. This supports the observations of most studies in the country and outside the country.[6-10] Komolafe et al in Ife however, found a mean age of 53 years in their patient population.[11] The frequency of tetanus in this survey is lower than most studies in the country.[9-13] This is likely a reflection of immunization coverage. A lower frequency of tetanus was recorded among females with a male to female ratio of 4.5: 1. This has also been reported in some previous local and foreign studies.[6-17]. There is no known biological reason in males or in the pathobiogy of the disease that can explain the sex difference. The observed discrepancy may be linked to lack of protective immunity against tetanus ocasioned by lack of boster doses of the tetanus vacination among men in comparison to the improved immunization coverage with boster doses for women especially during pregnancy.[17,18] Ogunrin et al however , reported slight preponeance in females.[19] The reason for this finding is not well understood.

The patients in this survey were largely from the lower socioeconomic strata of the society and the portal of entry for the disease was largely lower extremity injuries and lesions. The commonest clinical manifestation of tetanus among them were trismus and painful spasms (100%) followed by rigidity of the neck and risus sardonicus. This clinical profile has similarly been reported in the literature by several authors.[6-16]

Tetanus is a dreaded disease with records of high mortality. The overall case fatality rate (CFR) et al

from this study was 37%. Ojini and Danesi reported a similar case fatality rate of 36.96% in a study of 349 cases between 1990 and 1999 from Lagos, [15] but Sanya et al reported 64% in a review of 202 cases between 1990 and 2001 from Ibadan[20] and in Benin City, Ogunrin et al reported a mortality rate of 26.2% with an age-adjusted fatality rate of 16.2% for those less than 40 years of age in a review of 66 cases between 1990 and 2000.[19] Higher mortality rates of 57.1%, 53.5%, 44% were also reported from in southwest Nigeria by different authors. [7,11,16,] Owolabi et al reported mortality of 46% from Kano in a 10-year review[8] whereas Chukwubike and God'spower reported a case fatality rate of 42.9% among 86 cases from PortHarcout. [6] In Ethiopa Amanuel et al reported a case fatality rate of 35.3% [13]whereas in India , Anuradha reported 37.78%. [21]

Intensive care facilities have been found to reduce mortality from tetanus and mortality rates as low as 10% have been reported from units with facilities for intensive care.[23,24] The case fatality recorded in this study is however 50% percent mortality among the patients managed in the intensive care unit. One of the mortality cases in the intensive care unit was caused by failure to regain consciousness from the effect of anaesthesia after being weaned off from ventilation two weeks after cessation of spasms. The second patient died from overwhelming sepsis and ensuing renal failure. The third patient developed severe hypotension following intubation and died of cardiac arrest . Interestingly one patient managed in the intensive care unit had tracheostomy without ventilator support and performed excellently well despite the presence of complications. It is not very clear why intensive care services did not improve the outcome as expected among the patients. Plausible reasons include severe hypotension induced by induction agents and oversedation. Ojini et al also found that intensive care did not reduce mortality.[15]

The poor prognostic indicators in our study included short incubation period less than 7 days, onset time less than 2 days, severe tetanus especially with autonomic features and the presence of complications like aspiration pneumonia, severe sepsis and acute kidney. These observations have been documented in other studies. [15,16,19,21]

No case of post-abortal or puerperal tetanus was recorded during the period under review. This is in sharp contrast to findings in previous studies [11]and may also reflect an improvement in maternal and child health care services in recent years in the region.

The complications commonly seen among our patients included aspiration pneumonia, laryngeal spasm and respiratory failure, autonomic dysfunction with marked diaphoresis, labile hypertension, arhythmias (tachy- or bradycardia), acute kidney injury and sepsis. These observations support the findings in both local and foreign studies.[8-16,19]

The specific objectives of tetanus treatment are to stop the production of toxin at the site of infection with appropriate wound care and antibiotic use; to neutralize circulating toxin with anti-tetanus immunoglobulin; and to provide effective management of muscle spasm, respiratory failure, autonomic dysfunction, and complications. The patients in our study received wound care where present and metronidazole with or without any other antibiotic, anti-tetanus serum /immunoglobulin and high doses of diazepam to control spasms. The average dose of diazepam received was 216.2mg ±112.04mg per day. The use of these treatment modality have been reported to reduce mortality and morbidity of tetanus patients admitted to hospital.[15] Even in settings with limited resources, if basic medication, experienced medical supervision, and high-quality nursing can be provided, mortality can be reduced.[25] In the author's experience the greatest impediment to improved survival of tetanus patients in our environment is the lack of access to appropriate medical care.

Conclusion

Tetanus is a preventable life threatening illness that is still a significant cause of morbidity and mortality in Delta State as observed in this

hospital, especially among young working class males in their prime of life. There is need to increase efforts at awareness creation and providing protective tetanus immunization especially for men in form of booster doses during preschool and pre-employment medical examination programs. Also improvement in hygienic practices and increased nursing care and medical supervision will go a long way to reduce the attendant mortality in patients with tetanus.

REFERENCES

1. Centers for Disease Control and Prevention. Tetanus. In W Atkinson et al., eds. Epidemiology and Prevention of Vaccine-Preventable Diseases, 12th ed., Washington, DC: Public Health Foundation. 2011, pp. 291300.
2. Feingold SM. Tetanus. In: Collier L, Balows A, Sussman M, eds. Topley & Wilson's Microbiology and Microbial Infections. 9th ed. New York: Oxford University Press, 1998: 694722.
3. Gill DM. Bacterial toxins: a table of lethal amounts. Microbiol Rev 1982; **46:** 8694.
4. Schiavo G, Matteoli M, Montecucco C. Neurotoxins affecting neuroexocytosis. Physiol Rev 2000; **80:** 717766.
5. Ablett JJL. Analysis and main experiences in 82 patients treated in the Leeds Tetanus Unit. In: Ellis M, editor. Symposium on tetanus in Great Britain. Boston Spa, UK: Leeds General Infirmary; 1967. p. 1-10.
6. Chukwubike OA, God'spower AE. A 10-year review of outcome of management of tetanus in adults at a Nigerian tertiary hospital. Ann Afr Med 2009;8: 168-172.
7. Fawibe AE. The Pattern and Outcome of Adult Tetanus at a Sub-urban Tertiary Hospital in Nigeria Journal of the College of Physicians and Surgeons Pakistan 2010, Vol. 20 (1): 68-70
8. *Owolabi LF, Aliyu I, Nagoda, M et al. Clinical profile and outcome of adult tetanus in Kano.* Sahel Medical Journal, 2010, Vol 13, (4): 67-68. Http://dx.doi.org-/10.4314/-smj2.v13i4.67508
9. Tadessa A, Gebre-Selassie S. Five year review of cases of adult tetanus management at Gondar University Hospital, North West Ethiopia (Gondar, Sept.2003-Aug 2008). Ethiop Med. J. Oct 2009; 47(4): 291-7.
10. Onwuekwe IO, Nwabueze AC. Experience with tetanus in a tertiary hospital in the South East Nigeria. Nigerian Journal of Medicine journal of Resident doctors of Nigeria. April 2008; 17(1): 50-52
11. Komolafe MA, Komolafe EO, Oqundere AO. Pattern and outcome of adult tetanus in Ile-Ife, Nigeria, Niger J. Clinical. Practice. Dec 2007; 10 (4): 300-3.
12. Adeuja AOG, Osuntokun BO. Tetanus in the adult Nigerians. A review of 503 patients . East . Africa Med., 1971; 4(12): 683-691
13. Amanuel A, Yilma M, Desalar M. Tetanus in adults : clinical presentation, treatment and mortality in Ethiopia. Journal of Neurological sciences. Mar 2012; 317(1-2): 62-65
14. Sinha A, Seth BC, Ali MH, Mondal K, Bhattacharya R .Study of Clinical Profile of Tetanus Patients at ID & BG Hospital, Kolkata. National Journal of Medical and Allied Sciences 2014; 3(2):4-8
15. Ojini FI, Danesi MA Mortality of tetanus at the Lagos University Teaching Hospital, Nigeria. Top Doct,2005 Jul;35(3):178-11
16. Arogudade FA Bello IS, Kuteyi EA, AkinsolaA. Patterns of presentation and mortality in tetanus: a 10-year retrospective review. Niger Postgrad Med J. 2004 Mar 11(1); 58-63
17. Centers for Disease Control and Prevention. Advisory Committee on Immunization Practices (ACIP) Recommended Immunization Schedules for Persons Aged 0 Through18 Years and Adults Aged 19 Years and Older. United States, 2013. *MMWR.* 2013;62(Suppl 1):1-19.
18. Orimadegwu AE, Adepoju AA, Akinyinka OO .Prevalence and social demographic factors associated with non-protective

immunity against tetanus among high school adolescent girls in Nigeria. Ital J. Paediatr 2014 , Mar 17; 40(1): 29-32 . do; .10.118/1824-7288-40-29

19. Ogunrin OA, Unuigbe EI Tetanus: an analysis of prognosticating factors of cases admitted into the medical wards of a tertiary hospital in a developing African country between 1990 and 2000. Niger Postgrad Med J, 2004 Jun;11(2):9-102
20. Sanya EOI, Taiwo SS, Olarinoye et al. A 12-year review of cases of adult tetanus managed at the University College Hospital, Ibadan, Nigeria. Trop Doct. 2007 Jul;37(3):170-173.
21. Anuradha S. Tetanus in adults, a continuing problem: Analysis of 217 patients over 3 years from Delhi, India, with special emphasis on predictors of mortality. Med J Malaysia. 2006 Mar;61(1):7-14.
22. Bardenheier B, Prevots DR, Khetsuriani N et al. Tetanus surveillance- united States, 1995-1997: Morbidity and Mortality Weekly Report; 1998. Report No. 47: p. 1-13.
23. Brauner JS, Vieira SR, Bleck TP. Changes in severe accidental tetanus mortality in the ICU during two decades in Brazil. Intensive Care Med 2002; 28: 93035.
24. Thwaites CL, Yen LM, Nga NT, et al. Impact of improved vaccination programme and intensive care facilities on incidence and outcome of tetanus in southern Vietnam, 19932002. Trans R Soc Trop Med Hyg 2004; 98**:** 67177.
25. Salimpour R. Tetanus of the newborn in Tehran. A ten year study of 880 cases. J Trop Pediatr Environ Child Health 1978; 24: 14042.

Citation

This article should be cited as: *"Obiabo YO. Clinical Profile and Outcome of Adult Tetanus in Oghara, Delta State.* Afr. J. Trop. Med. & Biomed. Res 2014; 3 (1): 22-28".

Prevalence of Cardiovascular Risk Factors Among Factory Workers in the Beverage Industries in Edo State, Nigeria

[1]*Awunor NS,* [2]*Isah EC*

ABSTRACT

Introduction: This study sought to determine the prevalence of hypertension, diabetes mellitus, obesity and other cardiovascular risk factors among factory workers in beverage industries in Edo State, Southern Nigeria.

Materials and methods: An analytical cross sectional study was carried out among 349 respondents (201 respondents in the bottling Industry and 148 respondents in the brewing Industry), using researcher-administered questionnaires, observational checklist and an in-depth interview guide. Data was analyzed using SPSS version 16.0 and STATCALC with results presented in tabular form.

Results: Majority of the respondents fell within the age range 25-34 years. The mean ages of respondents for respective industries were; bottling 30.2 (±7.9) and brewing 39.8 (±12.2) years. Majority of respondents were male (92.8%). This survey reported a prevalence of hypertension as 98 (28.1%), diabetes mellitus 5 (1.4%) and obesity 29 (8.3%). One hundred and seventy one (49%) respondents regularly took alcohol, 5.4% of respondents smoked cigarettes while 56.2% were involved in regular exercise. Pre-employment medical examination was reported by 53.0% of respondents. Recreational facilities were absent in both industries.

Conclusion: This study has highlighted the prevalence of hypertension, diabetes mellitus and obesity in the beverage industries in Edo State, Nigeria; and the need to implement NCD control strategies in the beverage industry.

Keywords: *Hypertension, diabetes mellitus, obesity, beverage Industries, Benin City*

Correspondence: *Awunor NS [1]Department of Community Medicine, College of Health Sciences, Delta State University, Abraka, Nigeria;*

INTRODUCTION

The increasing prevalence of non-communicable diseases (NCDs) in developing countries in addition to the unsatisfactory level of control of infectious diseases should be a cause for grave concern to the health authorities in Nigeria. The World Health Organisation has increasingly brought to the fore the rising global prevalence of NCDs and which has become the leading cause of death in some western countries[1].

NCDs such as cardiovascular diseases, diabetes mellitus and obesity cannot be conveniently wished away as simply a problem of developed economies. The adoption of western lifestyles and diet, increasing physical inactivity, alcohol consumption and a poor culture of health checks predispose the populace to an increased risk of developing cardiovascular diseases[2-5]. This becomes increasingly worrisome given the weak state of the health delivery systems in Nigeria, poor disease surveillance activities especially for NCD and a slowly responsive national health management information system to integrate health information[6,7].

The prevalence of hypertension as reported by various surveys in Nigeria according to a review by Ogah et al[8] ranges from 8-46.8% depending on the study target population, type of measurement and cut off values. Other studies also fall within this range [9-10]. The prevalence of obesity in Nigeria ranged from 8.1- 22.2%[11,12] while that of diabetes mellitus ranged from 2.2-6.8%[13,14].

Most control programmes using the framework of primary health care target communities where

the people live, however, a significant segment of the population can best be reached where they work. The industrial workplace, therefore, offers an opportunity for appropriate health initiatives to be carried out and these targeted health promotional activities can help to reduce the burden of non- communicable diseases within the workforce[15]. Published studies in the beverage industry on prevalence of non-communicable diseases are scarce and baseline data will be needed to adequately plan for the health needs of these factory workers.

This study sought to determine the prevalence of hypertension, diabetes mellitus, obesity and other cardiovascular risk factors among factory workers in the beverage industries in Edo State.

Materials and methods

The study was carried out in Benin City, Edo State, Southern Nigeria. Factory workers in a bottling (Nigerian Bottling Company PLC) and a brewing (Bendel Breweries Limited) industry in Edo state were studied. The survey was an analytical cross-sectional study. The total population of respondents available and who consented to the study was used.

Data was collected using a pre-tested, structured questionnaire. Anthropometric measurements was done for height using a portable light weight stadiometer measuring range 6-78 inches (15-195cm) and graduations in 1/8 inch (1mm) with respondent barefoot, feet together and looking ahead. Body weight was measured in kilograms using weighing scale with maximum capacity of 150kg in divisions of 100 grams with respondents standing upright, without shoes and in light clothing after standardizing. Body mass index was computed as weight in kilogram divided by height in metres squared. Indices were categorized as underweight (<18.5), normal weight (18.5-24.9), overweight (25.0-29.9) and obese (≥ 30.0)[15].

Blood pressure measurement was done using an OMRON M2 basic digital automatic blood pressure monitor with accuracy of calibration at ±3mmHg and a range of measurement of 0-299mmHg. Two measurements were taken at least 15minutes apart (first at the start of the interview between 3-5 minutes of the respondent sitting for the interview and then towards the end of the interview at the point when other physical measurements were taken). The lower cuff was approximately 2cm above the elbow, measurement was taken with the cuff covering about three quarters of the left arm. Two blood pressure readings were taken and the mean of the two readings recorded as the individual's blood pressure measurement. The respondents were classified using the WHO-ISH criteria for grading blood pressure. Elevated blood pressure was taken as ≥140 / ≥90 mmHg following the American Heart Association recommendation to determine prevalence[16] of hypertension. Random blood glucose measurements was taken from the eligible respondents all of whom gave their consent (as the researcher could not guarantee a fast among the factory workers during the course of the survey) using the ACCU CHEK^{R} Active blood glucose monitoring system with a measuring range from 10-600mg/dl (0.6-33.3mmol/L) and following standard precautions. The test strip was inserted with the silver coloured bars facing up and toward the meter (meter would turn on automatically). The researcher and his assistants wore disposable latex hand gloves then verified that the code on the meter display matched the code on the test strip vial. A sample was obtained by pricking the side of the finger tip, after cleaning the site with methylated spirit and cotton wool, gently with a lancet using standard precautions until a drop of blood formed. When the blood drop symbol flashed on the display the drop of blood was touched and held to the edge of test strip (to make sure all the yellow area was filled). The result was then read. Sharps were disposed in a safety box while disposable hand gloves and spirit swab was disposed in a lined plastic bin. Respondents were then classified using the WHO criteria into normal (<140mg/dL), impaired glucose tolerance (141-199mg/dL) and diabetes mellitus (≥200mg/dL).

Data was analyzed using SPSS version 16.0 and STATCALC. Results were reported in statements and frequency tables. Statistical significance was set at $p<0.05$, the odds ratio for presence of risk

factors for cardiovascular disease in both industries were significant where the 95% confidence interval was not inclusive of 1.0.

An in-depth interview was conducted with respective human resources managers in both Industries using an interview guide. An observational checklist was used to inspect the workplace. A written informed consent form was attached to each of the questionnaires which was signed by respondents after full explanation of the purpose of the study by the researcher or research assistant. Respondents were duly informed on the voluntary nature of participation in the study. No token or inducement was given to respondents who agreed to take part in the study. Permission was sought and obtained from the management of the respective beverage industries who participated in the study. Institutional clearance was obtained from the University of Benin Teaching Hospital Ethics and Research Committee. All respondents voluntarily agreed to participate in screening for hypertension, diabetes mellitus and obesity. Respondents with abnormal readings were counseled and promptly referred to the Industry clinic or the University of Benin Teaching Hospital for further medical care.

Results

Three hundred and forty nine respondents drawn from the bottling (201) and brewing (148) Industry participated in the study. Most respondents fell within the age range 25-34 years (41.0%). Majority of respondents were male (92.8%), most were married (51.9%), most had a tertiary level of education (55.6%). (Table 1)

Table I: Socio-demographic characteristics of respondents

Variable	Industry		Total	χ^2 / p-value
	Bottling N=201 n (%)	Brewing N=148 n (%)	(N=349) n (%)	
Age (years)				
15-24	49 (24.4)	20 (13.5)	69 (19.8)	
25-34	113 (56.2)	30 (20.3)	143 (41.0)	
35-44	22 (10.9)	43 (29.1)	65 (18.6)	85.25/ 0.001*
45-54	15 (7.5)	31 (20.9)	46 (13.2)	
>55	2 (1.0)	24 (16.3)	26 (7.4)	
Mean(SD)				
(t/pvalue)	30.19(±7.9)	39.83(±12.2)		t= 0.59/ 0.553
Sex				
Male	190 (94.5)	134 (90.5)	324 (92.8)	
Female	11 (5.5)	14 (9.5)	25 (7.2)	2.04/ 0.153
Marital status				
Single	117 (58.2)	51 (34.5)	168 (48.1)	19.26/ 0.001*
Married	84 (41.8)	97 (65.5)	181 (51.9)	
Level of education				
Primary	12(6.0)	22 (16.3)	34 (9.7)	
Secondary	54 (26.9)	66 (45.2)	121 (34.7)	26.82/ 0.001*
Tertiary	135 (67.1)	58 (39.2)	194 (55.6)	

*Significant

Among respondents, the prevalence of hypertension was 98 (28.1%), the prevalence of diabetes mellitus was 5 (1.4%), while that of obesity was29 (8.3%). (Table 2)

The survey showed that 18 (5.4%) of respondents were smokers, 171 (49%) took alcohol regularly while 196 (56.2%) were involved in regular exercise/ sporting activity (i.e jogging, brisk walking and football).(Table 2).

The presence of risk factors for developing cardiovascular disease was lower in the bottling industry, this was statistically significant [OR s) (95%CI)] for; Obesity 0.42 (0.19-0.91), Age (>45 years) 0.16 (0.09-0.28) and regular alcohol intake 0.31 (0.19-0.47). (Table 2).

One hundred and eighty five (53.0%) of respondents had a pre-employment medical examination. Twenty (5.7%) of the respondents claimed to have been previously diagnosed (past medical history) as being hypertensive, diabetic or both.

There were no recreational facilities observed in both industries.

Table II: Hypertension, diabetes mellitus, obesity and select risk factors for cardiovascular diseases among respondents

Risk factor	Industry				Total		Odds Ratio
	Bottling (n=201)		Brewing (n=148)		(N=349)		(95% CI)
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	
Hypertension	53 (26.3)	148 (73.3)	45 (30.4)	103 (69.6)	98 (28.1)	251 (71.9)	0.82 (0.51-1.31)
Diabetes mellitus	1 (0.5)	200 (99.5)	4 (2.7)	144 (97.3)	5 (1.4)	344 (98.6)	0.18 (0.02-1.62)
Obesity	11 (5.5)	190 (94.5)	18 (12.2)	130 (87.8)	29 (8.3)	320 (91.7)	0.42 (0.19-0.91)*
Age (>45years)	17 (8.5)	184 (91.5)	55 (27.4)	93 (72.6)	72 (20.6)	277 (79.4)	0.16 (0.09-0.28)*
Alcohol intake	74 (36.8)	127 (96.0)	97(66.9)	51 (33.1)	171(49.0)	178(51.0)	0.31 (0.19-0.47)*
Cigarette smoking	8 (4.0)	193 (96.0)	11 (7.4)	137 (92.6)	18 (5.4)	330 (94.5)	0.52 (0.20-1.32)
Exercise	116 (57.7)	85 (42.3)	80 (54.0)	68 (46.0)	196 (56.1)	153(43.8)	1.16 (0.76-1.77)

**Significant*

Discussion

The rising prevalence of non-communicable diseases in middle and low income countries remains a cause for concern. In the midst of weak health systems and low budgetary allocation to health care, the industrial workforce could be better served by strengthening occupational health services especially in the area of health promotion and disease control. The beverage industry offers an insight into the burden of hypertension, diabetes mellitus and obesity in workplace settings with a closer relevance to the general population. The national policy on occupational health and safety seeks to create a framework for the improvement of working conditions and working environment in Nigeria[15]. However, in the absence of health screening programmes and periodic surveys it will be near impossible to adequately plan for the health of the working population.

Barely above half (53%) of the factory workers had a pre-employment medical examination. Pre-employment medical examination provides a baseline on workers' health and can serve to alert on major deviations over time in worker's health.

The prevalence of hypertension in this study was similar to that derived from a systematic review of previous surveys in Nigeria[8-10].The prevalence of diabetes mellitus[13] and obesity[11] in the beverage industries, however, was lower than the national prevalence. The healthy worker effect would predict a lower prevalence for hypertension, diabetes mellitus and obesity in this group compared to the general population.

Both industries lacked recreational facilities, the presence of recreational facilities though not a guarantee of their use, is simply a step in the right direction for workplace health promotion, this is a culture still lacking in the planning and design of industries in developing countries like Nigeria. Whereas adequate nutrition, regular exercise and recreation all play a role in reducing the prevalence of cardiovascular diseases; cigarette smoking, physical inactivity, alcohol and obesity are known risk factors for son developing cardiovascular diseases. Interventions should thus target these risk factors. Inter industry comparison showed that the brewing industry with a higher mean age, proportion of respondents who took alcohol, level of inactivity and obesity (all risk factors to developing cardiovascular diseases) had a higher proportion of respondents screened as hypertensive. Further studies could establish factors determining interindustry variation to make interventions more specific.

While the physical nature of the factory work might offer some protection in preventing cardiovascular diseases, unhealthy lifestyle choices such as excessive alcoholic intake and cigarette smoking can counter-balance the erstwhile benefits derivable from exercise. Hypertension like most non-communicable diseases is insidious in onset and unless screened for might only be detected when complications and end organ damage sets in. Industries and other corporate organizations should deliberately create awareness on the need for periodic health checks. The national policy on occupational health and safety advocates the setting up a health and safety committee in each industry, this should be enforced[15]. A day, three days or one week in a year, as deemed appropriate by the respective industries could be set aside for occupational health and safety awareness programmes. These Industries by adapting such health promotion programmes will be proactive in detecting (and controlling) these non-communicable diseases of public health importance; thereby improving the health and productivity of the workforce.

Pre-employment, periodic, post-illness medical examination and health promotion activities should be the norm in both industries. Appropriate preventive and disease control measures should be put in place to maintain a healthy and productive workforce. Health surveillance activities by state health authorities could also target workplace health service settings to obtain relevant health information where available for proper occupational health planning.

References

1. World Health Organisation. Factsheet: Non communicable diseases. March 2013.
2. Ogunleye OO, Ogundele SO, Akinyemi JO, Ogbera AO. Clustering of hypertension, diabetes mellitus and dyslipidemia in a Nigerian population: a cross sectional study. *Afr J Med MedSci* 2012; 41(2): 191-5.
3. Oladapo OO, Salako L, Sodiq O, Shoyinka K, Adedapo K, *et al.* A prevalence of cardiometabolic risk factors among a rural Yoruba South Western Nigerian population: a population based survey. *Cardiovasc J Afr.* 2010; 21 (1): 26-31.
4. Akinboboye O, Idris O, Akinboboye O, Akinkugbe O. Trends in coronary artery disease and associated risk factors in Sub-Saharan Africans. *Journal of Human Hypertension.* 2003; 17: 381-7
5. World Health Organisation. Obesity: prevention and managing the global epidemic. Report of a *WHO Technical Report Series.* 894. Geneva: World Health Organisation. 2000.
6. Federal Ministry of Health. National policy on integrated disease surveillance and response (IDSR). Abuja, FMOH.
7. Ofili AN, Ugwu EN, Ziregbe A, Richards R, Salami S. Knowledge of disease notification among doctors in government hospitals in Benin City, Edo State Public Health. 2003; 117: 214-217.
8. Ogah OS, Okpechi I, Chukwu II, Akinyemi JO, Onwubere BJC,*et al.* Blood pressure, prevalence of hypertension and hypertension related complications. *World J Cardiol.* 2012; 4(12): 327-340.
9. Ekwunife OI, Aguwa CN. A meta-analysis of prevalence rate of hypertension in Nigerian populations. *Journal of Public Health and Epidemiology*. 2011; 3 (13): 604 607.
10. Ofili AN, Omuemu VO. The Knowledge and prevalence of risk factors for hypertension among workers in the banking Industry in Benin City, Edo State, Nigeria. *The Tropical Journal of Health Sciences.* 2005; 12 (1): 26 30).
11. Chukwunonye II, Chukwu A, John C , Ohagwu KA, Imoh ME, *et al.* Prevalence of overweight and obesity in Nigerians- a systematic review. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy* 2013; 6: 43-47.
12. World Health Organisation. Obesity: prevention and managing the global epidemic. Report of a WHO Technical Report Series. 894. Geneva: World Health Organisation. 2000.
13. Mbanya J, Ramiaya K. Diabtes mellitus disease and mortality in Sub-Saharan Africa. 2003.Available @Http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi? book=dmssa&part=A1764 accessed on 19/06/10.
14. Nyenwe EA, Odia OJ, Ihekwaba AE, Ojule A, Babatunde S. Type 2 diabetes in adult Nigerians: a study of its prevalence and risk factors in Port Harcourt, Nigeria. *Diabetes Res ClinPract.* 2003; 62(3): 177-85.
15. Federal Ministry of Labour. National policy on occupational safety and health. 2006
16. National health and nutrition examination survey (NHANES) III. Body measurements (anthropometry) manual available from: www.cdc.gov/nchs/data/nhanes3/cdrom-/nchs/manual/anthro.pdf (cited 14/09/2010 1400hrs)
17. Pickering TG, Hall JE, Appel W, Falkner BE, Graves J, *et al.* Recommendations for blood pressure measurements in humans and experimental animals: part 1: blood pressure measurements in humans: a statement for professional and public education of the American Heart Association Council on high blood pressure research. Hypertension. 2005; 45: 142 61.

Citation
This article should be cited as: *"Awunor NS, Isah EC. Prevalence of Cardiovascular Risk Factors Among Factory Workers in the Beverage Industries in Edo State, Nigeria".* Afr. J. Trop. Med. & Biomed. Res 2014; 3 (1): 29-34".

Patterns of Hysterosalpingographic Findings at a Tertiary Hospital in South-South, Nigeria: AThree-Year Review

Joyce E. Ikubor and Godson U. Eze

ABSTRACT

Introduction: Hysterosalpingography (HSG) is an investigative tool for assessing the morphology of the uterine cavity and more importantly tubal patency in the routine workup of infertile females. This study aimed to highlight the indications for this imaging technique and the patterns of its findings at Delta State University Teaching Hospital, Oghara.

Materials and methods: A cross-sectional review of one hundred and seventy-five reports of women referred to the Radiology department for HSG over a 3-year period; January 2012 - December 2014.

Results: Infertility was by far the most common indication for undergoing an HSG; as seen in 145 (82%) of the women studied. Secondary infertility was the predominant type of infertility accounting for 127 (87.6%) of all cases of infertility for HSG. While nearly half of all HSG records, 79 (45.4%) showed tubal blockage, four-fifths (80.4%) had abnormal-sized uterus.

Conclusion: HSGs done at DELSUTH showed a wide array of findings. Infertility was the most common indication for referral as was the case in many similar studies from developing countries. Tubal blockage and abnormal uterine size were the most common findings and although suspected uterine anomaly was the indication for over a tenth of the referrals, there was no case of congenital anomaly detected among the patients in this three-year review.

Keywords: *Hysterosalpingography, Infertility, Contrast-Imaging, Nigeria*
Correspondence: *Joyce E. Ikubor, Department of Radiology, Delta State University Teaching Hospital, Oghara, Delta State. Email: joyceikuborjune12@yahoo.com*

INTRODUCTION

The role of HSG as an accurate means of assessing the state of the uterine cavity and tubal patency is well known. It stands out as the main investigative tool for assessing the morphology of the uterine cavity and most importantly tubal patency in the routine workup of female infertility.[1,2] Ultrasonography and magnetic resonance imaging are other cross-sectional imaging modalities used for assessment of the female pelvis, but HSG has the advantage of being cheap and readily available even in resource poor settings. The use of water soluble contrast medium is also relatively safe and readily demonstrates the anatomy and morphology of the uterine cavity and fallopian tubes. The main disadvantage of contrast HSG is exposure to ionizing radiation unlike ultrasonography and magnetic resonance imaging, and the procedure-associated pain.[1] Infertility workup is therefore incomplete without an initial HSG examination especially in poor resource settings contrary to the opinions of a few authors who claim that HSG is outdated.[3] Infertility has remained the commonest and the most current indication for HSG overshadowing other conditions that may necessitate the use of this imaging modality of the female reproductive tract[1,4]. This is not surprising given the high prevalence rates of infertility in both developed and developing countries.[5] Infertility is a global social problem and a major reproductive health burden of Nigerian women, accounting for up to 70% of gynecological consultations in tertiary health institutions.[6]

Most of the hysterosalpingographic studies in the

Nigerian literature have therefore focused on the role of this imaging modality in the investigative work up of infertile patients and have demonstrated tubal and uterine factors as causes of primary and secondary infertility[3,5, 713]. Tubal pathology, specifically tubal blockage is the commonest abnormality on HSG recorded in most of the geopolitical zones of Nigeria as represented by studies done in Abakaliki, Lagos, Yenagoa, Sokoto and Maiduguri[5,7,8,11,13]. Bilateral tubal blockage has been reported as the major tubal pathology in female infertility.[8,9,13] A common recurrence in most of these studies is the combination of tubal and uterine factors in patients unlike in an Iranian study by Mesbahi et al which reported isolated uterine pathology as its major hysterosalpingographic finding.[14]

Other less common indications for this imaging modality include recurrent miscarriage, congenital anomalies, uterine synechiae, uterine fibroids, colo-tubal fistula, utero-vesical fistula, checking the efficacy of tubal sterilization and assessment of the tubes prior to attempted reversal of sterilization.[1,4,8]

The goal of this study was to highlight the indications of this imaging technique and the pattern of findings at Delta State University Teaching Hospital, Oghara over a three-year period as well as to document the common hysterosalpingographic features of women who presented for this examination in the study period with the hope that the information obtained would help guide future reproductive health care delivery and policies - especially in this setting.

METHODOLOGY

A review of records was done in a cross-sectional study of one hundred and seventy-five reports of women referred to the Radiology department for hysterosalpingography (HSG) over a 3-year period; January, 2012 to December, 2014 at Delta State University Teaching Hospital, Oghara, Nigeria.

To obtain acceptable records for review, poor quality images, inconclusive film series, imaging done without request forms and films with intravasation of contrast media were all excluded. The records were retrieved from Picture Archiving Communication System (PACS); the hospital's computerized image data bank.

A proforma was designed to capture the biodata, indications for the procedure, and the findings from the radiologist's report for each patient. Data extracted using the proforma was subsequently entered into the Statistical Package for Social Sciences (IBM® Inc, Chicago, Il. USA) version 20 data sheet, for analysis. Data extraction, collation and analysis lasted 6 months. Data has been presented as simple frequency tables, cross-tables, bar and pie charts. Means and proportions were calculated, while chi-square test and odds ratio were used to test associations. The level of significance was set at $p < 0.05$.

Ethical Issues: Permission was granted by the hospital administration for use of its data for this work and ethical clearance was obtained from the Hospital Research and Ethics Committee (HREC), DELSUTH, Oghara. All information obtained has been treated with utmost confidentiality. No personal identifiers of patients were published in any form.

RESULTS

One hundred and seventy five (175) HSGs were done during the study period with majority of the patients, 113 (64.6%) aged 30-39 years and a mean age of 33.7 ± 5.1 years. **(Table 1)**

Infertility was by far the most common indication for undergoing an HSG with 145 (82%) infertile women presenting for the examination. Secondary infertility was the predominant type of infertility accounting for 127 (87.6%) of all patients with infertility, while women with primary infertility were 12 (8.3%). Six records (4.1%) were excluded because information on type of infertility was not available. **(Figure 1)** Although HSG was indicated in all the patients, over a third (36%) of the HSGs done revealed no abnormality; While about a third, 36 (32.1%) of all abnormal HSGs had only tubal abnormalities, and a fifth, 23 (20.6%) had only uterine abnormalities. Almost half of all abnormal HSGs, 53 (47.3%) had both uterine and tubal findings. **(Table 1)**

Table 1: Summary of patients by age groups, indications for HSG and findings

Variable	Categories	Frequency (%) N = 175
Age Groups	< 30	36 (20.6)
	30 – 39	113 (64.6)
	= 40	26 (14.9)
		⁇ = 33.7 ± 5.1
Indication for HSG	Infertility	145 (82.9)
	Suspected uterine anomalies	21 (12.0)
	Others*	9 (5.1)
HSG Findings	Normal	63 (36.0)
	Abnormal	112 (64.0)
		n = 112
Female Factors	Uterine only	23 (20.6)
	Tubo-peritoneal only	36 (32.1)
	Both	53 (47.3)

*Others include: recurrent abortions, uterine fibroids, and suspected uterine synechiae

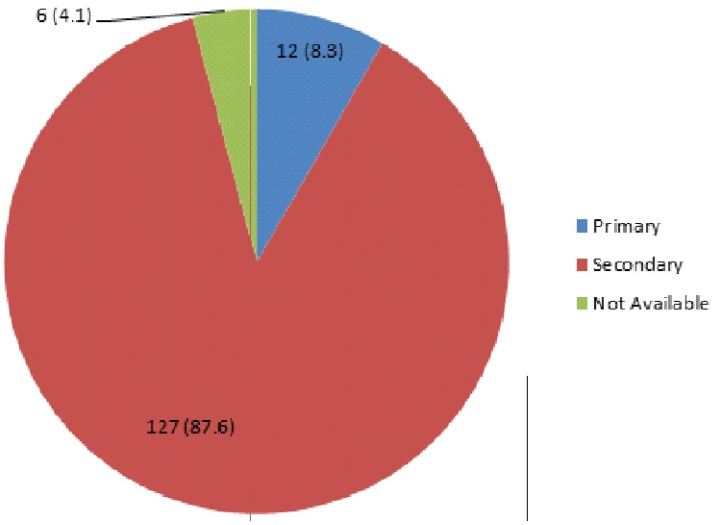


Figure 1: Distribution of types of infertility in patients' HSG reports

Tubal blockage was the commonest tubal pathology and constituted 45.4% of all abnormalities detected on HSG. It was found in 64 (44.1%) of women whose indication was infertility. Bilateral tubal blockage 37 (46.8%) was commoner than unilateral tubal blockage. In unilateral tubal pathology, there was a predominance of right tubal blockage 24 (30.4%) and right hydrosalpinx 8 (44.4%). Loculated spills did not show sidedness.

Figure 2: Profile of abnormal findings on HSG for the year 2012 - 2014

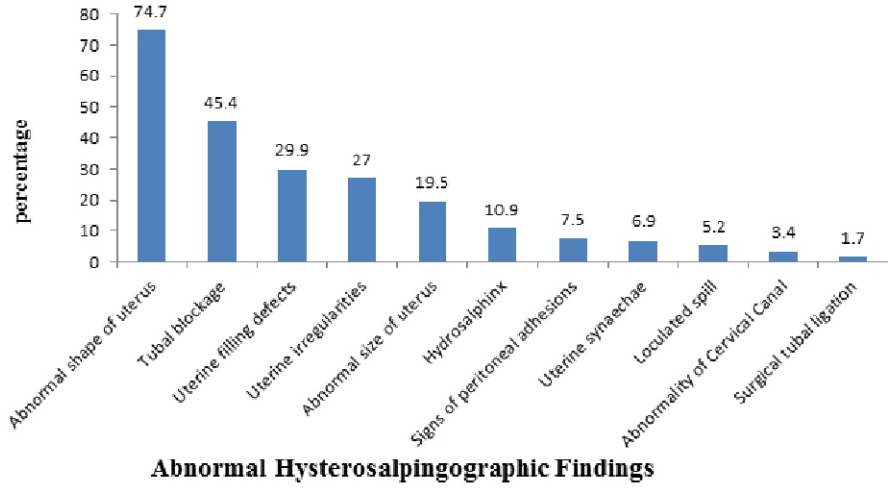


Table 2: Potential risk factors of infertility and associations in HSG reports of DELSUTH patients

Variable		Indication for HSG Frequency (%)		Odds ratio	95% Confidence Interval	
		Infertility n = 145	Other reasons n = 30		lower	upper
Uterine filling defect	**Yes**	37 (71.2)	15 (28.8)	**0.34**	0.14	0.83
	No	108 (87.8)	15 (12.2)			
		X^2 = 7.134, df = 1, p = 0.008				
Age group of patients	**> 35**	45 (83.3)	9 (16.7)	**1.05**	0.42	2.70
	= 35	100 (82.6)	21 (17.4)			
		X^2 = 0.012, df = 1, p = 0.911				
Uterine wall Irregularities	**Yes**	32 (68.1)	15 (31.9)	**0.28**	0.12	0.69
	No	113 (88.3)	15 (15.6)			
		X^2 = 9.872, df = 1, p = 0.002				
Tubal blockage	**Yes**	64 (81.0)	15 (19.0)	**0.79**	0.34	1.86
	No	81 (84.4)	15 (15.6)			
		X^2 = 0.345, df = 1, p = 0.557				
Size of Uterus	**Normal**	25 (73.5)	9 (26.5)	**0.49**	0.18	1.30
	Abnormal*	120 (85.1)	21 (14.9)			
		X^2 = 2.585, df = 1, p = 0.108				
Shape of Uterus	**Normal**	114 (87.7)	16 (12.3)	**3.22**	1.31	7.89
	Abnormal	31 (68.9)	14 (31.1)			
		X^2 = 8.321, df = 1, p = 0.004				
Uterine Synechiae	**Yes**	7 (58.3)	5 (41.7)	**0.25**	0.06	1.01
	No	138 (84.7)	25 (15.3)			
		X^2 = 5.455, df = 1, p = 0.020				
Loculated Spill	**Yes**	9 (90.0)	1 (10.0)	**1.92**	0.23	42.01
	No	136 (82.4)	29 (17.6)			
		X^2 = 10.525, df = 1, p = 0.001§				
Hydrosalpinx	**Yes**	16 (88.9)	2 (11.1)	**1.74**	0.35	11.61
	No	129 (82.2)	28 (17.8)			
		X^2 = 0.150, df = 1, p =0.699				

*Abnormal sized uterus refers to 'Too Small' or 'Too Large' uterus: proportion of both was equal. §Yates corrected

(Figure 2 & Table 3)

Figure 2 shows that about three-quarters, 84 (74.7%) of all HSGs with abnormal findings had uteri with abnormal shapes. Tubal blockage was found in 45.4%, uterine filling defects 29.9%, uterine irregularities 27.0%, and abnormal sized uterus 19.5%.

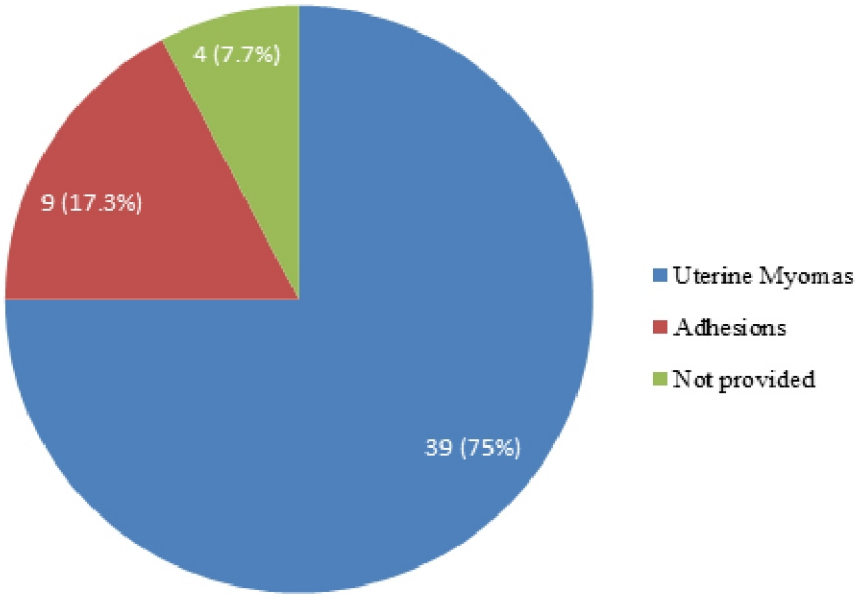
Of the potential predictors of infertility in **Table 2**, the following were statistically significantly different between women whose indication for HSG was infertility and those who had other indications: the shape of the uterus, uterine filling defects, uterine wall irregularity, uterine synechiae, and loculated spill; $p < 0.05$. The odds of infertility in women with normal-shaped uteri was over 3 times that in those with abnormally shaped uteri; OR: 3.44 (CI: 1.31 7.89).

While nearly half of all the HSG records, 79 (45.4%) showed tubal blockage, four-fifths (80.4%) had abnormally sized uterus (too small or too large), and a tenth had hydrosalpinx; but these findings showed no statistically significant association with infertility; $p > 0.05$. Loculated spills, though a small proportion, 10 (5.7%) were statistically significantly more in patients whose indication for performing HSG was infertility; $p = 0.001$. The most common cause of filling defects in this study was uterine myomas, 39 (75%). **(Figure 3)**

Table 3: Distribution of laterality of tubal findings on Hysterosalpingography

Variable	Location of finding Frequency (%)			
	Right-sided	**Left-sided**	**Bilateral**	**Total**
Tubal blockage	24 (30.4)	18 (22.8)	37 (46.8)	79 (100.0)
Hydrosalphinx	8 (44.4)	4 (22.2)	6 (33.3)	18 (100.0)
Loculated Spill	3 (27.2)	4 (36.4)	4 (36.4)	11 (100.0)

Figure 3: Causes of filling defects



DISCUSSION

Among all the patients reviewed over the three-year period, infertility was by far the most common indication (82%) for HSG referrals in DELSUTH, Oghara. This value is similar to that from a study in Zaria by Igashi et al[12] who reported 69.8%. HSG therefore remains an integral investigative tool for female infertility work up in this setting and even in settings where laparoscopy exists for assessing tubal factors.[5,6]

In this study, secondary infertility was commoner than primary infertility which is consistent with findings of a large number of previous studies.[5,3,713] The high proportion of secondary infertility, 87.6% which was seen in this study could be as a result of pelvic infections from post-abortal sepsis after unsafe abortions, post partum infections and sexually transmitted infections which were associated findings in studies with similarly high proportions in Lagos (84%) and Ilorin (80%).[3,7,9] At variance with findings of this study are higher proportions of primary infertility found in Iran and **Eastern Nepal** by Mesbahi et al and **Santhalia et al** respectively.[14,2] Unlike this study which found no congenital uterine anomalies, both studies reported congenital uterine anomalies and this may have been associated with the higher proportions of primary infertility. Mesbahi et al reported a prevalence of 5% for both arcuate uterus and bicornuate uterus.[14]

About a third (36.0%) of the HSGs reviewed in this study revealed no abnormality which compares with similar studies done in Abakaliki[5] (21.8%) and sokoto[11] (41.7%) respectively. These findings contradict the pervading notion that prospective studies reveal a significantly higher number of normal HSGs than do cross-sectional or retrospective studies.[5]

Tubal blockage was the leading tubal pathology in this study as has been reported by other studies.[5,7,10,2] Bilateral tubal blockage (46.8%) which was more prevalent than unilateral tubal blockage as was also seen in studies at Nnewi, Yenagoa, and Maiduguri.[8,9,13] In contrast to findings of this study, a Zaria study found preponderance of unilateral tubal blockage.[12] Tubal spasm has been misinterpreted as bilateral cornual blockage and laparoscopy has therefore been recommended for cases of bilateral tubal blockage.[5,9,15] The practice at the study site is to routinely administer intramuscular Hyocine Bromide (Buscopan®) 20 mg which is thought to be helpful in preventing spastic tubal occlusion[1] to all patients at the beginning of the procedure. A similar practice was reported by a 2012 study in Switzerland on HSG work up for female infertility,[15] although the drug is given intravenously and only in patients identified with cornual blockage. Among the tubes with unilateral blockage, right sided tubal blockage was the more prevalent as was also seen by Akinola et al in Lagos[7] and Danfulani et al in Sokoto[11] but contrary to the prevalence of left-sided tubal blockage seen by Imo et al in Abakaliki and Bukar et al in Maiduguri.[5,8]

The low prevalence of hydrosalpinx in this study is similar to findings in Lagos by Akinola et al.[7] However, a higher prevalence was seen in the study by Bello[3] in Ilorin in which hydrosalpinx was the commonest tubal abnormality. The higher prevalence of right hydrosalpinx is in agreement with studies done in Ilorin and Abakaliki [4,5,8] but contrasts with studies in Lagos, Sokoto and Nnewi.[7,9,11] The predominance of right sided tubal pathology as seen in this study, has been linked with inflammation of the appendix in previous studies.[5,12]

Almost half of all the abnormal HSGs in this study, 53(47.3%) had both uterine and tubal findings buttressing the fact that most patients with infertility could have multiple factors as the aetiology of female infertility. Similar findings have been documented in studies around Nigeria[8,11,12,] and even in some developed countries[15].

In this study, nearly a fifth of all HSGs had abnormal sized uterus. Abnormal sized uterus may be small sized which could be due to infections or large sized due to myomas.[14] Uterine size has been associated with patient's age and parity.[16] Other uterine abnormalities that were associated with about 20 50% of all abnormal HSGs were abnormal uterine shape and filling

defects. The most common cause of uterine filling defects in this study were uterine myomas, 39 (75%) which is in agreement with previous studies.[12,14,15]

Conclusion

In this three-year review of HSG findings in which infertility was the most common indication for referral, a wide array of findings were seen. Abnormal uterine size and tubal blockage were the most common findings and although suspected uterine anomaly was the indication for over a tenth of the referrals, there was no case of congenital anomaly detected among the patients.

REFERENCES

1. Crofton M. Gynaecological Imaging. In: Sutton D, ed. *Textbook of Radiology and Imaging*. 7th ed. India: Churchill Livingstone, Elseviere; 2009:1069-1105.
2. Santhalia PK, Gupta M, Uprety D, et al. Role of Radiographic Hysterosalpingography in Infertility in Eastern Nepal. *Nepal J Radiol*. 2013;3(4):59-66.
3. Bello TO. Pattern of Tubal Pathology in Infertile Women on Hysterosalpingography in Ilorin , Nigeria. *Ann Afr Med*. 2004;3(2):77-79.
4. Chapman S, Nakielny R. *A Guide to Radiological Procedures*. 4th ed. China: Saunders; 2001.
5. Imo AOC, Sunday-Adeoye I. Radiological assessment of the uterus and fallopian tubes in infertile women at Abakaliki, Nigeria. *Niger J Clin Pract*. 2008;11(3):211-215.
6. Lim CP, Hasafa Z, Bhattacharya S, Maheshwari A. Should a hysterosalpingogram be a first-line investigation to diagnose female tubal subfertility in the modern subfertility workup? *Hum Reprod*. 2011;26(5):967-971.
7. Akinola R a, Akinola OI, Fabamwo a O. Infertility in women : Hysterosalpingographic assessment of the fallopian tubes in Lagos , Nigeria. *Educ Res Rev*. 2009;4(3):86-89.
8. Bukar M, Mustapha Z, Takai UI, Tahir A. Hysterosalpingographic Findings in Infertile Women: a Seven Year Review. *Niger J Clin Pract*. 2011;14(2):168-170.
9. Eleje G, Okaforcha E, Umeononihu O, Udegbunam O, Etoniru I, Okwuosa A. Hysterosalpingographic Findings Among Infertile Women: Review at a Tertiary Health Care Institution in Nnewi, South-east Nigeria. *AFRIMEDIC J*. 2012;3(2):20-23.
10. Aremu A, Adekanle D, Asaleye C, Adetiloye V. Hysterosalpingography Tubal Infertility in an Environment with Non Liberalized Abortion Law. *Res J Med Sci*. 2012;6(3):142-144.
11. Danfulani M, Mohammed MS, Ahmed SS, Haruna YG. Hysterosalphingographic findings in women with infertility in Sokoto North Western Nigeria. 2014;13(1):19-23.
12. Igashi J, Joseph D, Joseph G, et al. Hysterosalpingography: A Re-Emerging Study in Health Care Transformation. *IOSR J Dent Med Sci*. 2014;13(12):37-40.
13. Kiridi EK, Ibrahim IA, Lawani L. Hysterosalpingography : Still relevant in the evaluation of infertility in the Niger Delta. 2015;4(1):0-4.
14. Mesbahi S, Pourissa M, Refahi S, Tabarraei Y, Dehghan M. Hysterosalpingographic Abnormalites in Infertile women. 2009;4(4):430-432.
15. Schankath AC, Fasching N, Urech-Ruh C, Hohl MK, Kubik-Huch RA. Hysterosalpingography in the workup of female infertility: indications, technique and diagnostic findings. *Insights Imaging*. 2012;3(5):475-483.
16. Esmaelzadeh S, Rezaei N, HajiAhmadi M. Normal uterine size in women of reproductive age in northern Islamic Republic of Iran. *East Mediterr Heal J*. 2004;10(3):437-441.

Citation
This article should be cited as: " *Joyce E. Ikubor and Godson U. Eze. Patterns of hysterosalpingographic findings at a tertiary hospital in South-South, Nigeria: a three-year review.* Afr. J. Trop. Med. & Biomed. Res 2015; 2 (2): 7-12".

ASSESSING RELIABILITY OF CARD AGGLUTINATION TEST FOR TRYPANOSOMIASIS IN SCREENING GAMBIAN SLEEPING SICKNESS AT ABRAKA ENDEMIC FOCUS

Umukoro DO[1], Ataikiru Pd[2]

[1]Department of Family Medicine, Delta State University, Abraka, Nigeria; [2]Department of Laboratory Science Technology, Delta State Polytechnic, Otefe-Oghara.

ABSTRACT

Introduction: Human African trypanosomiasis (HAT) is one of the neglected tropical diseases. It is endemic in Abraka, south south , Nigeria . Clinical features of this disease are not sufficiently specific for diagnosis of HAT; a definition diagnosis relies on laboratory examination. The card agglutination test for trypanosomiasis (CATT) is a useful fast practical serological test for HAT screening in endemic areas. There are indications that CATT results may be misleading since it is not 100% sensitive. The objective of the study was to evaluate the reliability of CATT test in Abraka sleeping sickness endemic focus.

Method: This study was carried out in Oria-Abraka for about two years from march 2013. A total of 254 consenting individuals were screened with CATT reagent. All sero-positive individuals were further subdivided into mild, moderate and severely positive. Detailed clinical examination and parasitological evaluation of blood, csf and aspirates of lymph node, of all seropositive individuals were done to confirm the diagnosis of HAT. 26 seropositive were followed-up for 24months and one for 3months.

Results: 27 of the 254 consenting individual tested positive to CATT test, giving a seropositivity of 10.6%. All the seropositive individuals were parasitologically negative after series of parasitological examinations over 24months period. They were all also positive to malaria parasite test.

Conclusion: Card Agglutination Test for Trypanosomiasis is not specific enough for screening for trypanosome brucei gambiense infestation within the Abraka sleeping sickness endemic focus

Keywords:

Correspondence: *Umukoro DO, Department of Family Medicine, Delta State University, Abraka, Nigeria. Email: dunflox@gmail.com*

INTRODUCTION

Human African Trypanosomiasis (HAT) also called sleeping sickness is one of the neglected tropical diseases[1] caused by *Trypanosoma brucei gambiense*, in west Africa [1,2,3] and *T. b. rhodesiense* subspecies is found in central and southern Africa.[4] In Abraka, Delta State Nigerian, it is called '*Oga-Ovwere*' which means 'illness of sleep'. The early stage of the disease is difficult to differentiate from other common mild febrile illness even in the endemic areas. The late stage is characterized by excessive sleep which progresses gradually to seizure.[4] Without appropriate treatment intervention, the illness leads to death. Clinical features of the disease are not sufficiently specific for diagnosis. Definitive diagnosis of *T . b. gambiense* relies on laboratory examinations for parasite identification in blood, lymph node and or cerebrospinal fluid (CSF) [2]. A three step approach is utilized during control programmes while evaluation of individual patient involves screening, diagnostic confirmation and clinical staging [5]. The card agglutination test for trypanosomiasis (CATT) was developed in the late 1970s [6]. It can be performed on serum, capillary blood from finger prick or blood eluted from impregnated filter paper [7].It is a fast and practical serological test that allows hundreds of individuals to be screened daily.[8,9,10] The reported sensitivity is

within a range of 87 to 98% and the specificity has a range of 76 to 80% [8]. It is widely used for extensive population screening in endermic areas.[2,11]. There are indications that CATT result might be misleading since it is not 100% sensitive and the negative individual, may turn out to be parasitological positive. The objective of this study was to evaluate the reliability of CATT test in Abraka sleeping sickness endemic focus.

Methods and Materials

This investigation was carried out at Oria-Abraka in March 2013 during the one week medical out-reach to mark the 1st coronation anniversary celebration of the Ovie of Umeghuva Abraka kingdom. The kingdom is located between latitude 5º47'-6º15' N and longitude 5º42'-6ºE with a population of about 150,000 people.[12] The study communities were situated within a mixed rain forest and derived grassland vegetation with river Ethiope and its tributaries running through the kingdom.

The predominant economic activity is agrarian peasant farming with some artisans, transporters, traders and civil servants. All communities in the kingdom were duly sensitized for the outreach activities. Investigations commenced with daily enlightenment lectures on the nature, objectives and benefits of the investigations. Informed consent was sought and obtained from individuals (n=254) that volunteered to be screened. Questionnaire was administered to obtain participants' information on bio-data and their awareness of HAT.

Finger pricked blood was drawned into heparinized capillary tube. A drop of freshly CATT regent was added to a drop of blood, on a plasticized surface and mixed. All seropositive individuals were further sub-divided into three; using CATT reagent by serial double dilution. The reaction was graded as negative with no visible agglutination and slight, moderate or strong reactivity for those with visible agglutination as positive with 1:2-1:4, 1:8-1:16 and ≥1:32 titres respectively.

The seropositive individuals were given one week appointment for detailed clinical examination and parasitological investigations to confirm presence or absence of parasite in blood smears and aspirate from cervical lymph nodes and, CSF. FBC, blood smear for trypanosome, filarial and malaria parasite microscopy and urinalysis test. Only strongly seropositive volunteers had lumber puncture under standard procedure and the CSF analyzed for trypanosome, cell count, and protein estimation. 26 of the 27 seropositive individual were followed up monthly for 24 months and one for three months. The later relocated after three months. During the follow up visits, clinical examination and laboratory tests were performed monthly and half-yearly, respectively. Data obtained were subject to statistical analysis.

Results

A total of 254 individuals comprised of males (n=86) and females (n=168) were screened for HAT with CATT reagent. The age of the sample population ranged between 16 to 72 years with a mean of 42±2 years. 82.3% were farmers while 17.7% were artisans, traders, transporters, civil

Table 1: Seroreactivity of sera to CATT reagents.

No of individual	Negative		Positive		Total	
	n	(%)	n	(%)	n	(%)
Male	78	90.7	08	09.3	86	100
Female	149	88.7	19	11.3	168	100
Total	227	89.4	27	10.6	254	100

Table 2: Degree of Seropositive among Catt Positive individuals

Degree of CATT positivity	Male		Female		Total	
	n	%	n	(%)	n	(%)
Mild	05	62.5	05	26.3	10	37.0
Moderate	03	37.5	11	57.9	14	51.9
Severe	00	00.0	03	15.8	03	11.1
Total	08	100	19	100	27	100

servants and retired individual. The participants awareness of HAT was 87.2%. Table 1 shows that 27(10.6%) of the sample population (n=254) tested were, CATT positive.

ALL the 27 (100%) CATT postive individuals had malaria parasites in the blood films while 21 (77.8%) had low and 6 (22.2%) moderate grade parasitaemia. They were however clinically asymptomatic. The seropositive individuals were slightly (n=10, 37%) moderately (n=14, 52%) and strongly (n=3, 11%) seropositive. 7 (25.9%) of the seropositives had cervical and anxillary lymphadenopathy and aspirates from these nodes were trypanosome negative. 23 (85.2%) of the 27 individuals were anaemic (PCV <30%) but none was below 24%. Parasitological examination of the blood, lymph node aspirate, buffy-coat and the CSF were all parasitological negative at follow-up. The white blood cells (WBC) and protein levels in the CSF, were normal.

DISCUSSION

CATT reagent has been very useful in screening for HAT in endermic focus of Abraka.[1,3,12].s Besides, it is easy to handle and also easy to train personnel to use it even at short notice. The sensitivity and specificity of CATT are said to be particularly high.[9]. However, we have observed that results from screening programmes have shown some percentage of seropositivity but the parasite positivity is discouraging.[13,14]

From this study we observed that all seropositive individuals were parasitological negative after series of parasitological examinations were performed on the blood smear and lymph node aspirates, before and at follow-up for two years. Admitted that parasites detection in blood smear, lymph node aspirate and CSF using standard diagnostics methods could be difficult. With repeated parasitological assesments, it is capable of improving the chances of finding a trypanosome in an infected individual. More importantly, a patient with sleeping sickness was expected to deteriorate and show obvert clinical signs and symptoms within the 24 months period of follow-up and sleeping sickness cases would become clinically obvious.[15]

It has been reported by Dukes D.G *et al.* that CATT results might be misleading in specific areas as a result of the absence of LiTac 1.3 antigen. Absence of this antigen in *T. b. gambiense* probably in circulation may render CATT not suitable for use in this focus.[16]. CATT has been recommended for screening of populations where the prevalence of HAT is less than 5% and the positive predictive value remains too low.[15]. Hence, the need for parasitological confirmation becomes inevitable.

Abraka is a known active sleeping sickness endemic focus[17] and may not have access to the highly sensitive serological tests such as immunofluorescence or enzymelinked immunosorbent assay due to high cost and skill required. These tests are generally used in non-endemic developed countries to screen individuals with suggestive clinical features or previous exposures.[18;19]. Since serological tests are not 100% sensitive, it was recommended to search for trypanosome in individuals with negative serological tests who have strong clinical suspicion of HAT.[20].

The inability of WHO to eradicate HAT in subSahara Africa could possibly be due to unreliability of CATT, which is the commonest and the most 'reliable' screening tool. Many seronegative individuals may continue to constitute reservoirs of infection in their communities [20].

From this study, it was observed that all seropositive individuals had malaria parasitamia. This could be indicative of cross-reactivity. This finding calls for further research to establish its implication on the reliability of the CATT. Based on the finding from this study, we conclude that CATT is not specific enough for HAT within Abraka sleeping sickness endemic focus. The observed outcome might be attributed to the Gambian type of the disease as compared to the Rhodescian type that possess the major LiTac 1.3 antigen use for the CATT reagent. To this end, more reliable screening methods should be sort to enable the various HAT control programmes have the desired objectives.

REFERENCES

1. C.Isaac, O.P.G. Nmorsi, I.B.Igbinosa, D.O. Umukoro, C.I.Ikaraoha And N.C.D. Ukwandu; Trace Metal Profiles Of Nigerians With Trypanosome Brucei Gambiense-Infection, Journal Of Parasitology And Vector Biology. Vol.3 (1) Pp. 8-11, January 2011.
2. Bisoffi, Z., Beltrame, A., Monteiro, G., Et Al. African Trypanosomiasis Gambiense, Italy. Emerg. Infect. Dis. 2005; 11: 1745-1747.
3. C.Isaac, O.P.G. Nmorsi, I.B.Igbinosa, D.O. Umukoro; Vitamins (A,B1 and C) Status Of Nigerians With Trypanosome Brucei Gambiense-Infection, Reviews In Infection. Rif 1(4):188-191 (2010)
4. Harrisons Principles Of Internal Medicine Ninth Edition, Section 14, Page 876-879.
5. Chappuis F, Pittet A, Bovier PA, Et Al. Field Evaluation Of The CATT/*Trypanosoma Brucei Gambiense* On Blood-Impregnated Filter Papers For Diagnosis Of Human African Trypanosomiasis In Southern Sudan. Trop Med Int Health 2002; 7: 942-948
6. Noireau F, Forcebarge P, Cattand P. Evaluation of Testryp CATT applied to samples of dried blood for the diagnosis of sleeping sickness. Bull World Health Organ 1991; 69: 607-608.
7. Magnus E, Vervoort T, Van Meirvenne N. A card agglutination test with stained trypanosomes (CATT) for the serological diagnosis of *T.b. Gambiense* trypanosomiasis. Ann. Soc. Belge Med. Trop. 1978; 58: 169-176.
8. Penchenier L, Grebaut P, Njokou F, Eboo Eyenga V, Buscher P. Evaluation of LATEX/*T.b.gambiense* for mass screening of *Trypanosoma brucei gambiense* sleeping sickness in central Africa. Acta Trop. 2003; 85: 31-37
9. Truc P, Lejon V, Magnus E, et al. Evaluation of the micro-CATT, CATT/*Trypanosoma brucei gambiense*, and LATEX/T b gambiense methods for serodiagnosis and surveillance of human African trypanosomiasis in west and central Africa. Bull World Health Organ 2002; 80: 882-886. Pubmed
10. WHO. Control and surveillance of African trypanosomiasis. Geneva: World Health Organization, 1998.
11. Lutumba P, Robays J, Miaka C, et al. The efficiency of different detection strategies of human African trypanosomiasis by *T. B. Gambiense*. Trop Med Int Health 2005; 10: 347-356.
12. C.isaac, o.p.g. Nmorsi, i.b.igbinosa, d.o. Umukoro, imarenezor .e.p.k., ihimire .i.g and akinboyeku. A.w.; interleukin (il)-10 and tumor necrosis factor-alpha (tnf-α); profiles of Nigerians with trypanosome brucei gambiense infection. Annals of biological research, 2010,1(2):62-67
13. Checchi F, Filipe JA, Haydon DT, Chandramohan D, Chappuis F. Estimates of the duration of the early and late stage of gambiense sleeping sickness. BMC Infect. Dis. 2008; 8: 16
14. Active transmission of trypanosome brucei gambiense Dutton www.ajol.infor vol.3, no 2 (2008)
15. Dukes P, Gibson WC, Gashumba JK, et al.

Absence of the litat 1·3 (CATT antigen) gene in *Trypanosoma brucei gambiense*

16.Noireau F, Lemesre JL, Nzoukoudi MY, Louembet MT, Gouteux JPF, Frezil JL. Serodiagnosis of sleeping sickness in the Republic of the Congo: comparison of indirect immunofluorescent antibody test and card agglutination test. Trans. R. Soc. Trop. Med. Hyg. 1988; 82: 237-240.

17 Lejon, V., Buscher, P., Magnus, E., Moons, A., Wouters, I. And Van Meirvenne, N. A semi-quantitative ELISA for detection of *Trypanosoma brucei gambiense* specific antibodies in serum and cerebrospinal fluid of sleeping sickness patients. Acta Trop. 1998; 69: 151-164.

18. Truc P, Lejon V, Magnus E, et al. Evaluation of the micro-CATT, CATT/*Trypanosoma brucei gambiense*, and LATEX/T b gambiense methods for serodiagnosis and surveillance of human African trypanosomiasis in west and central Africa. Bull World Health Organ 2002; 80: 882-886.

19. WHO. Control and surveillance of African trypanosomiasis. Geneva: World Health Organization, 1998.

SPUTUM AFB POSITIVITY OF SUSPECTED TUBERCULOSIS PATIENTS IN A TERTIARY HOSPITAL IN BENIN CITY NIGERIA

Osarogiagbon WO[1], Iyoha O[2]

[1]Department of Child Health, University of Benin, Benin City, Nigeria; [2]Department of Medical Microbiology, University of Benin, Benin City, Nigeria

Background: Tuberculosis ranks as the second leading cause of death from infectious diseases worldwide only next to HIV. It is a chronic debilitating condition caused by a bacterium of the genus Mycobacterium, mainly mycobacterium hominis.

Aim: To determine the prevalence of AFB positivity among patients attending University of Benin Teaching Hospital.

Material and Methods: A retrospective record review was done by extracting relevant data from the records of patients screened for PTB using sputum AFB in UBTH over a 1-year period. Analysis was done using SPSS Version 20.0.

Result: Of the 895 patients results reviewed, 123 (13.7%) were positive, 772 (84.2%) were negative. Of the 123 that were positive 47 (37.6%) were females and 76 (62.4%) were males. Of the negatives, 432 (56.0%) were females and 340 (44.0%) were males. The difference between the male and female positivity was statistically significant with a p value of 0.0001. The highest number of positive cases were seen in the age range 30 39 years (30: 18.6%). Of those that had positive sputum samples, 6 (4.9%) were children age less than 18 years.

Conclusion: The prevalence of positivity in the study area is relatively high compared to other regions, there is therefore need for concerted efforts at all levels of government to put in place programmes that will encourage poverty reduction and overcrowding while at the same time encouraging immunisation.

Keywords: *Tuberculosis, prevalence, chronic disease, sputum positivity*

Correspondence: *Osarogiagbon WO, Department of Child Health, University of Benin, Benin City, Nigeria. Email: divinewilbel@yahoo.com*

INTRODUCTION

Tuberculosis (TB) remains a major global health problem, causing chronic disease in millions of people each year.[1,2] TB ranks as the second leading cause of death from infectious diseases worldwide only next to HIV.[1-3] Tuberculosis is a chronic debilitating disease caused by a bacteria of the genus Mycobacterium.[1-6] Two main species are important to man, the hominis or tuberculosis and the bovis (from infected cow products). Tuberculosis can infect several organs or tissues of the human body, the commonest being the lungs.[2-4] It is very difficult to make a diagnosis of tuberculosis clinically, since it mimics many other chronic conditions especially in the lungs.[4-6]

Following the introduction of BCG immunization and improvement in the standards of living especially good housing in several parts of the world, including Nigeria, the prevalence of the disease especially the severe forms had experienced a downward trend.[1,3,4,7-9] However, from clinical observations and reports, there appears to be a resurgence of cases of PTB in different parts of the world especially in the developing world where the economic downturn and the rising rate of poverty due to corruption and bad government (coupled with rising cases of internal and external displacement due to war and natural disasters) have all connived with the HIV pandemic to push up the numbers of new cases

of PTB in these poor communities.[2,4,5,8-11] The gory picture painted above, is the case of many poverty striking countries of Asia and sub-Saharan Africa.[2,4,8-12] The latest estimate by WHO (2014 report) showed that there are 9.0 million new cases of PTB in 2013 globally (range 8.6 9.4 million) equivalent to 126 cases per 100 million people.[1] Fifty-six percent of this occurred in Asia and African region 29%,[8-12] whereas the European region have only 4% and America 3%. The six countries that stood out as having the largest number of incidence of new cases in 2013 are India (2.0 2.3 million), China (0.9 1.1 million), Nigeria (340 880 thousand), Pakistan (370 650 thousand), Indonesia (410 520 thousand), and South Africa (410 520 thousand). There was a total of 1.5 million PTB deaths in 2013, out of which 1.1 million was among HIV negative people and 0.5 million HIV positive people. Of the 9.0 million new cases in 2013, estimated 550 thousand were children and 3.3 million (3.2 3.5 million) occurred among women.[1,8-10,12-14]

In the countries worst hit by the PTB resurgence, there is decimation of the workforce since PTB affects mainly the middle-age group (15 45 years) which provides the workforce of a country.[3-5,8,9,13-15] Children are not only infected by the adults, but are also affected by PTB in adults, since children whose parents develop PTB will eventually loose their source of livelihood and end up with malnutrition and many will drop out of school. Those that are eventually orphaned by PTB may even suffer worse fate.[1,3,4,8,13]

In the control of PTB, identification of cases i.e. case detection and treatment is an integral part of the National Leprosy and Tuberculosis Control Programme (NLPTBCP).[1,3,4,13-19] This is vital because microscopy is central to the diagnosis and treatment of PTB in the DOTs strategy for the prevention of this condition.[13,18-20] Despite recent advances in the diagnosis of PTB with novel techniques like Gene expert using the PCR principles and automated liquid culture method using radioactive carbon impregnation,[21-24] many resource poor countries still rely completely on sputum positivity to make diagnosis.[1-6,8-13] For sputum microscopy to be reasonably effective in diagnosing PTB if the rate of positivity is low, there may be need to augment the sputum test with other methods.[24-27] Furthermore, it is also a reflection of the prevalence of PTB in an area since the more endemic PTB is in an area, the more sputum positivity we are likely to get. In the control of PTB, identification of cases i.e. case detection and treatment is an integral part of the National Leprosy and Tuberculosis Control Programme (NLPTBCP) in Nigeria and worldwide.[1,3,4,13-19] Therefore, microscopy is central to the diagnosis and treatment of PTB in the DOTs strategy for the prevention of this condition.

It is important to emphasise standard laboratory procedure in handling of samples. Concentration of sputum, use of fluorescent microscopy and other internal/external control methods are employed to increase the positivity of sputum test.[3,4,9,28] The International Union Against Tuberculosis and Diseases (IUATLD) recommends screening an average of 10 suspects to identify one smear-positive case (IUATLD, 1978).[29] In a study in Ibadan Nigeria by different teams of workers in 1975 by Onedeko *et al* and Kolawole *et al* in 1975, both teams reported sputum positivity rate of 30 and 57% respectively,[15,30] but the rate in Benin City remains unknown. Therefore this study was carried out to determine the prevalence of sputum positivity using microscopy in a resource poor country like Nigeria where culture and gene expert is not routinely done (with a minimum recommended positivity rate of 10% and previously reported 30 and 57% respectively in Ibadan at the back of our mind).[15,29,30]

The last countrywide survey was done in 2012 in Nigeria, there is also therefore the need for repeated regional surveys.

Methods

A retrospective record review was done by looking at records (PTB register) of patients screened for PTB using sputum AFB in UBTH for all patients with clinically suspected PTB and who submitted sputum for examination at the

central PTB laboratory over a 1-year period. Referrals were from virtually every part of the hospital. Therefore the register is the central record of all the PTB patients screened in UBTH. University of Benin Teaching Hospital is a 700 bedded hospital in the South South Geopolitical Zone of Nigeria (Edo State), serving up to about 5 states namely; Edo, Delta, Ondo, Kogi and Anambra. The study involved the review of PTB register and collation of relevant data concerning age, sex, and sputum positivity.

The PTB laboratory conduct sputum smear microscopy by ZN method according to WHO recommendation protocol.[8,31] The primary stain was done using carbolfuchsin which was heated along with the sputum on a slide, then decolouration was done with either 3% hydrochloric acid or 25% sulphuric acid for 1 minute then following by addition of 98% alcohol. Counter staining was done with methylene blue for 1 minute, the slide was read under the microscope using oil immersion.[8,31]

Case definition of Sputum Positivity

It is important to note that 3 samples were collected for the AFB staining. Out of these 3 samples, a single positive result or more out of the three was taken as positive, secondly, all those that had two or three positive samples were also taken as positive.[6,7,32] Negative results were recorded when all the 3 samples were negative. Also, patients that submitted only one or two samples and one of or the only sample was positive, such patient was taken as positive. But if a patient submitted one or two samples and they were negative, such a patient was classified as incomplete since there was a possibility that the missing sample could have been positive.[6,7,32] Analysis of sample was done using SPSS Version 20.0.

Results

General Characteristics of Subjects

Total number of subjects 895, 478 (53.4%) males and 417 (46.6%) females. The mean age of all respondents is 38.24 yrs (±13.31), while the mean age for males was 54.43 yrs (±28.8) and for females 56.02 yrs (±26.6). The difference between the mean age for males and females was statistically significant with a p value of 0.0001. Of the 895, 123 (13.7%) were positive, 772 (84.2%) were negative. Of the 123 that were positive 47 (37.6%) were females and 76 (62.4%) were males. Of the negatives, 432 (56.0%) were females and 340 (44.0%) were males. The difference between the male and female positivity was statistically significant with a p value of 0.0001.

Table I: General Characteristics of Subjects

Variable	Sex		Total	χ^2	P value
	Male	Female	All Subjects		
Total number of patients	478	417	895		
Mean age (age ± SD) yrs	54.43(28.8)	56.02 (26.6)	38.24 (13.3)		0.0001
Age range					
0 – 9	13 (61.9)	8 (38.1)	21 (100)		
10 – 19	38 (60.3)	25 (39.7)	63 (100)		
20 – 29	54 (45.0)	66 (55.0)	120 (100)		
30 – 39	76 (46.6)	87 (53.4)	163 (100)		
40 – 49	28 (42.2)	38 (57.8)	66 (100)	10.39	0.169
50 – 59	28 (38.9)	44 (61.1)	72 (100)		
60 – 69	37 (52.9)	33 (47.1)	70 (100)		
>70	16 (51.6)	15 (48.4)	31 (100)		
Missing data	289		32.3		
Sputum AFB Positivity					
Positive	47 (38.2)	76 (61.8)	123 (100)		
Negative	340 (44.0)	432 (56.0)	772 (100)	14.017	0.0001
Total			895 (100)		

As shown in **Table I**, the age range 30 39 had the highest number of respondents 163 (18.2%). The paediatric age group 0 9 had 21 (2.3%) the smallest number of respondents.

Sputum Positivity and Age

Of the 895 respondents, 289 had incomplete data. Of the 606 with correct data, sixty (9.9%) were children below 18 years, the remaining 547 (90.1%) were adults. Out of the 123 positive cases found in this study, 6 (4.88%) were children 18 years and below, the remaining 117 (95.12%) were adults, and the difference in positivity between the proportion of adult and children positive was statistically significant (P=0.04), these are shown in **Table II**.

Table II: Proportion of AFB Positive who are Peadiatric

Variable		Positive of AFB		Total	X^2	P
		Positive	**Negative**			
Age Range	Paediatric age group	6 (4.9%)	54 (11.2%)	60	4.101	0.043
	Adult age group	117 (95.1%)	429 (88.8%)	546		
Total		**123 (100%)**	**483 (100%)**	**606**		

Table III: Age and Sputum AFB Positivity

Variable		Sputum AFB Result		Total	X^2	P
		Positive	**Negative**			
Age Range	0 – 9	1 (0.8%)	20 (4.1%)	21	13.264	0.066
	10 – 19	8 (6.5%)	55 (11.4%)	63		
	20 – 29	25 (20.3%)	95 (19.7%)	120		
	30 – 39	38 (30.9%)	125 (25.9%)	163		
	40 – 49	16 (13.0%)	50 (10.4%)	66		
	50 – 59	14 (11.4%)	58 (12.0%)	72		
	60 – 69	12 (9.8%)	58 (12.0%)	70		
	>70	9 (7.3%)	22 (4.6%)	31		
Total		**123 (100%)**	**483 (100%)**	**606**		

Table IV: Source of Referral of Respondents

Variable	Frequency	Percent (%)
A/E	25	2.8
CHER	4	0.4
CLINIC	227	25.4
DOT	223	24.9
WARD	416	46.5
Total	895	100

Table III shows the sputum positivity. The age range 30 39 had the highest number of positivity i.e. 38 (30.9%) of the 123 positive patient. The positivity of 0 9 was the lowest which is 1 (0.8%).

Source of Patients

Out of the 895 patients, 416 (46.5%) were from the ward, various specialist clinic contributed 227 (25.4%), DOTs contributed 223 (24.9%) as shown in **Table IV**.

Discussion

Sputum smear still remains a major tool for the diagnosis of PTB in Nigeria. In this study, the sputum positivity rate was 13.7%, which compares well with values from different part of the world that reported values between 12 to 20%.[6,18,32,33] In a study in Rwanda by Muvunyi *et al*[6], a rate of 17.3% was reported, which is comparable to the 13.7% gotten in the current study. Importantly the IUATLD recommendation of 10% minimum[29] shows that our 13.7% is well above the recommended minimum and as such results of sputum test from such a centre could be seen as effective in detecting sputum positivity.

Previous studies in Ibadan Nigeria had reported higher values of 30 and 57% in two separate studies.[15,30] In another study from Eastern Nigeria by Nwadike *et al*,[32] out of the 379 suspected PTB cases that had sputum AFB done, 195 (51.5%) were sputum positive. This value is also higher than the value from the recent value despite the fact that the method of sample collection, handling and staining are similar. The study from Eastern Nigeria was hospital-based with a smaller sample size compared to the Benin study, which had a remarkably higher sample size. More so, the study from Eastern Nigeria only studied children older than 10 years. Therefore, the inclusion of those children from 0 18 years in the Benin study may have accounted for a reduction in the positivity rate. Importantly, the contribution of HIV/AIDs to the pattern of PTB may also have affected the sputum positivity,[34,35] since the rate of sputum positivity is likely to be higher in the presence of HIV.

Also in agreement with various other co-workers[8,13,32,36], more males in this study was positive when compared to females with a p value of 0.0001, which was highly significant. This may be due to the fact that males more than females engage in different activities that bring them in contact with this organisms, while females are meant to stay at home and in some cultures, females are meant to remain indoors for most part of the day.

The age range 30 39 years had the highest number of respondents and also had the highest number of sputum positivity of 38 (30.9%) of the 123 positives. When the group 20 49 are merged, the picture agrees well with the finding of highest positivity from the group 15 44 years.[15,30,32] This is mainly the group that is very active and always on the move, thereby providing the workforce of the nation, and as such they are more likely to come in contact with the organism due to their wide interaction.

The study from Rwanda[6] and Eastern Nigeria[32] were conducted in the chest units, but that from Benin is a combination of the patients in the entire hospital. This may have contributed to the high rates in the Enugu value which was conducted in the chest unit.

It is important to monitor the procedure of specimen collection and health educate patient on the need for production of a good specimen from deep seated cough rather than saliva and the need for prompt transportation.[37,38] These may affect the rate of positivity if not addressed.[37,38]

Conclusion

The sputum microscopy is a reliable means of detecting and diagnosing pulmonary tuberculosis in the study area. The prevalence and burden of PTB in the study area is relatively higher than other regions in Nigeria. There is therefore the need for concerted effort to reduce the prevalence of PTB in the region. This should not be left for government alone, since malnutrition, overcrowding and personal/environmental hygiene may not completely be within the purview of the government alone.

Recommendations

There is need for routine evaluation and monitoring of the sputum positivity rate from our laboratory, to ensure that the case detection rate of the sputum microscopy is within the acceptable minimum prescribed.

Limitations

This study was a retrospective study and as such

many of the respondents did not record their biodata fully, leading to a lot of incomplete data.

Contribution by authors

The study was conceptualised by both authors. The data collection was done by both authors and both authors also contributed to writing the paper.

Funding

There was no source of external funding for this paper.

Declaration of interest

None to be declared.

References

1. World Health Organisation. Global tuberculosis report. 2014, WHO/HTM/TB/2014.08.
2. Corbett EL, Watt CJ, Walker N, Maher D, Williams, BG, Raviglione MC, Dye C. The growing burden of tuberculosis: global trends and interactions with the HIV epidemic. *Achieves of Internal Medicine,* 2003; **163**:10091021.
3. Dye C, Scheele S, Dolin P, Pathania V, Raviglione MC. Consensus statement. Global burden of tuberculosis: estimated incidence, prevalence, and mortality by country. WHO Global surveillance and Monitoring project. *JAMA*, 1999; **282**: 677 686.
4. *Federal Ministry of Health. Department of Public Health. National tuberculosis and leprosy control programme: workers manual. Revised 5th ed. 2010. Abuja, Nigeria. Federal Ministry of Health 2010.*
5. Dim CC, Dim NR. Trends of tuberculosis prevalence and treatment outcome in an under-resourced setting: The case of Enugu state, South East Nigeria. *Nigerian Medical Journal*, 2013; **54**:392-7.
6. Muvunyi CM, Masaisa F, Bayingana C, Musemakweri A, Mutesa L, Hernandez TC. Prevalence and diagnostic aspects of sputum smear positive tuberculosis cases at a tertiary care institution in Rwanda. *African Journal of Microbiology Research*, 2010; **4**(1):088-091.
7. Ukwaja KN, Alobu I, Ifebunandu NA, Osakwe C, Igwenyi C. Trend in case detection rate for all tuberculosis cases notified in Ebonyi, Southeastern Nigeria during 1999-2009. *Pan African Medical Journal*, 2013; **16**:1-5.
8. *World Health Organisation. World health organisation global tuberculosis programme. Laboratory services in tuberculosis control, (WHO/TB/98.258 [Pt 2]), Geneva, Switzerland, 1998.*
9. World Health Organization. Expert Consultation on Improved the Diagnosis of Tuberculosis through Optimization of Sputum Microscopy. World Health Organization, Geneva, Switzerland, 2005.
10. Finch D, Beaty CD. The Utility of a single sputum specimen in the diagnosis of tuberculosis: comparison between HIV-infected and non-HIV-Infected Patients. *Chest,* 1997; **111**: 1174-1179.
11. Frieden TR, Sterling TR, Munsiff SS, Watt CJ, Dye C. Tuberculosis. *Lancet,* 2003; **362**:887-899.
12. Ipuge YAI, Rieder HL, Enarson DA. The yield of acid bacilli from serial smears in routine microscopy laboratories in rural Tanzania. *Transactions of the Royal Society of Tropical Medicine and Hygiene,* 1996; **90**: 258261.
13. *World Health Organization Geneva. TB Control as an Integral part of primary health care, 1988, 11.*
14. *Yassin MA, Datiko DG, Shargie EB. Ten-year experiences of the tuberculosis control programme in the southern region of Ethiopia. Int J Tuberc Lung Dis, 2006; 10(10): 1166-1171.*
15. *Onadeko BO, Dickinson R, Sofowora EO. Miliary tuberculosis of the lung in Nigerian adults. East Afr. Med. J. 1975; 52:390-5.*
16. *Awe A, Kabir M, Odusote T, Daniel O, Omoniyi A. Improved programme performance from tripartite partnership (USAID, WHO, NTBCP): The Nigerian experience 2002 - 2007 (poster abstract 14 - day 3). 18th International Union Against Tuberculosis and Lung Disease (The Union) - African region; 3 - 5 March, Abuja Nigeria, 2011.*
17. Harries AD, Kamenya A, Subramanyam VR, Salaniponi FM, Nyangulu DS. Sputum smears for diagnosis of smear positive

pulmonary tuberculosis. *Lancet,* 1996; **347**: 834835.

18. *Harries AD, Mphasa NB, Mundy C, Banerjee A, Kwanjana JH, Salaniponi FM. Screening tuberculosis suspects using two sputum smears. Int. J. Tuberc. Lung Dis. 2000; 4:36-40.*
19. *Holmes CB, Hausler H, Nunn P. A review of sex differences in the epidemiology of tuberculosis. Int. J. Tuberc. Lung Dis. 1998; 2:96-104.*
20. *Shargie EB, Lindtjørn B. DOTS improves treatment outcomes and service coverage for tuberculosis in South Ethiopia: a retrospective trend analysis. BMC Public Health, 2005; 5(62):1471-77.*
21. Garg SK, Tiwari RP, Tiwari D, Singh R, Malhotra D, Ramnani VK, Prasad GB, Chandra R, Fraziano M, Colizzi V, Bisen PS. Diagnosis of tuberculosis: available technologies, limitations, and possibilities. *J. Clin. Lab. Anal.* 2003; **17**:155-63.
22. Wu ZL, Wang AQ. Diagnostic yield of repeated smear microscopy examinations among patients suspected of pulmonary TB in Shandong province of China. *International Journal of Tubercle and Lung Disease,* 2000; **4**: 10861087.
23. *Wallis RS, Pai M, Menzies D, Doherty TM, Walzl G, Perkins MD. Biomarkers and diagnostics for tuberculosis: progress, needs, and translation into practice. Lancet, 2010; 375:1920-1937.*
24. *Ani A, Okpe S, Akambi M, Ejelionu E, Yakubu B, Owolodun O. Comparison of a DNA based PCR method with conventional methods for the detection of M. tuberculosis in Jos, Nigeria. J Infect. Dev. Ctries, 2009; 3(6): 470-475.*
25. Seni J, Kidenya BR, Obassy E, Mirambo M, Burushi V, Mazigo HD, Kapesa A, Majigo M, Mshana SE. **Low sputum smear positive tuberculosis among pulmonary tuberculosis suspects in a tertiary hospital in Mwanza, Tanzania.** *Tanzania Journal of Health Research,* 2012; *14(2):1-9.*
26. Crampin AC, Floyd S Mwaungulu F, Black G, Ndhlovu R, Mwaiyeghele E, Glynn JR. Comparison of two versus three smears in identifying culture-positive tuberculosis patients in a rural African setting with high HIV prevalence. *International Journal of Tubercle and Lung Disease,* 2001; **5**:994999.
27. Craft DW, Jones MC, Blanchet CN, Hopfer RL. Value of examining three acid-fast bacillus sputum smears for removal of patients suspected of having tuberculosis from the "airborne precautions" category. *J. Clin. Microbiol.* 2000; **38**: 4285-7.
28. Steingart KR, Ng V, Henry M, Hopewell PC, Ramsay A, Cunningham J, Urbanczik R, Perkins MD, Aziz MA, Pai M. Sputum processing methods to improve the sensitivity of smear microscopy for tuberculosis: a systematic review. *Lancet Infectious Diseases,* 2005; **6**: 664-674.
29. IUATLD. *Technical Guide for Sputum Examination for Tuberculosis by Direct Smear Microscopy*, 3rd edn. International Union against Tuberculosis and Lung Diseases, Paris, 1978
30. *Kolawole TM, Onadeko EO, Sofowora EO, Esan GF. Radiological patterns of pulmonary tuberculosis in Nigeria. Trop. Geogr. Med. 1975; 27:339-50.*
31. *Enarson DA, Rieder HL, Arnadottir T, Tréucq A. In: Management of tuberculosis: a guide for low-income countries. Paris: International Union Against Tuberculosis and Lung Disease, 2000; 1-89.*
32. Nwadike VU, Mbata GC, Kalu IE, Ojide KC, Nweke IG, Nwokeji CM, Nwokoro MU. Sputum smear positive tuberculosis among tuberculosis patients in a tertiary hospital in South Eastern Nigeria. *Sky Journal of Medicine and Medical Sciences*, 2013; 1(5):20 24.
33. *Katamba A, Laticevschi D, Rieder HL. Efficiency of a third serial sputum smear examination in the diagnosis of tuberculosis in Moldova and Uganda. Int. J. Tuberc. Lung Dis. 2007; 11:659-64.*
34. *Bhanvahka JN, Gupta R, Sharma DC. HIV Seropositivity in hospitalised pulmonary tuberculosis patients in Delhi. Indian Journal of Tuberculosis, 1997; 44:17-19.*
35. *Prasanthi K, Kumari AR. Efficacy of fluorochrome stain in the diagnosis of pulmonary tueberculosis co-infected with HIV. Indian Journal of Medical Microbiology, 2005; 23:179-185.*
36. *Van Deun A, Salim AH, Cooreman E, Hossain MA, Rema A, Chambugonj N, Hye MA, Kawria A, Declercq E. Optimal tuberculosis case detection by direct sputum smear microscopy: how much better is*

more? Int. J. Tuberc. Lung Dis. 2002; 6:222-30.

37. *Kehinde AO, Obaseki FA, Cadmus SI, Bakare RA. Diagnosis of Tuberculosis: Urgent Need to Strengthen Laboratory Services. JAMA, 2005; 97:394-397.*
38. *Khan MS, Osman D, Charalambos S, Karam S. Improvement of tuberculosis case detection and reduction of discrepancies between men and women by simple sputum-submission instructions: A pragmatic randomized controlled trial. The Lancet, 2007; 369:1955-1960.*

Citation
This article should be cited as: "*Osarogiagbon WO, Iyoha O.* Sputum AFB positivity of suspected Tuberculosis patients in a tertiary hospital in Benin City Nigeria. Afr. J. Trop. Med. & Biomed. Res 2015; 2 (2): 7-12".