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Effective acid control with Nexium™ [1]

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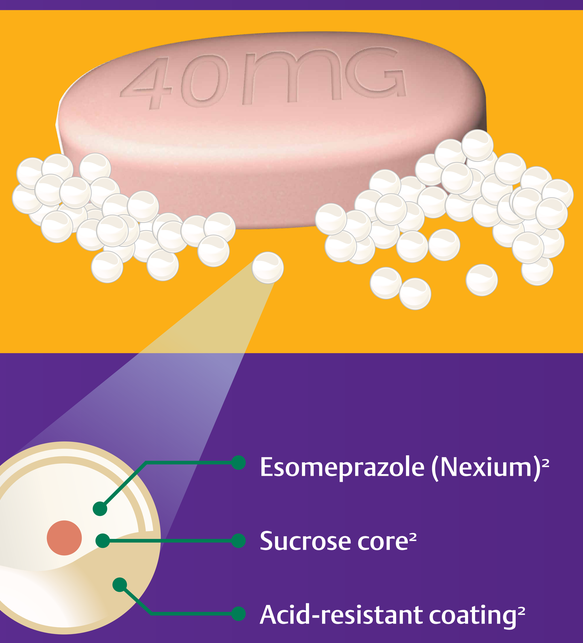
Formulated with Multiple Unit Pellet System (MUPS) technology[2, 3]

The MUPS formulation optimises delivery of Nexium to site of absorption[3]



MUPS[3]

- disperse rapidly in stomach
- ±1000 gastro-resistant micropellets per tablet
- absorption in high pH of duodenum

Nexium™ 40mg
esomeprazole

GERD: Gastroesophageal Reflux Disease

References: **1.** Miner PB, Katz PO, Chen Y, *et al*. Reanalysis of intragastric pH results based on updated correction factors for Slimline® and ZineticsTM 24 single-use pH catheters. *American Journal of Gastroenterology.* 2006;1:404-405. **2.** Sirisha KVR, Vijaya Sri K, Suresh K, *et al*. Multiple Unit Pellet Systems – A Review. *International Journal of Pharmacy*. 2012;2(2):419-425. **3.** Aubert J, Mulder CJJ, Schrör K, *et al*. Omeprazole MUPS: An advanced formulation offering flexibility and predictability for self medication. *SelfCare*. 2011;2(Suppl. 1):1-14

Nexium™ Tablets 20 mg and 40 mg. Each tablet contains 20 mg or 40 mg esomeprazole (as magnesium trihydrate). Contains sucrose 28 mg or 30 mg. **PHARMACEUTICAL FORM:** Gastro-resistant tablet. **THERAPEUTIC INDICATIONS:** NEXIUM tablets are indicated for Adults and adolescents from the age of 12 years for Gastroesophageal Reflux Disease (GERD), treatment of erosive reflux esophagitis, long-term management of patients with healed esophagitis to prevent relapse, symptomatic treatment of gastroesophageal reflux disease (GERD); Adults, In combination with appropriate antibacterial therapeutic regimens for the eradication of *Helicobacter pylori*, healing of *Helicobacter pylori* associated duodenal ulcer, prevention of relapse of peptic ulcers in patients with *Helicobacter pylori* associated ulcers; Patients requiring continued NSAID therapy, healing of gastric ulcers associated with NSAID therapy, prevention of gastric and duodenal ulcers associated with NSAID therapy, in patients at risk; Prolonged treatment after i.v. induced prevention of rebleeding of peptic ulcers, Treatment of Zollinger Ellison Syndrome.
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EDITORIAL

HEALTH RESEARCH AND MFM SUBSPECIALTY

Research has become an integral part of the fellowship programmes in Ghana. In the GCPS the examinations for these fellowships include the submission and defense of dissertations by the candidates and therefore there is the need for them to undertake crucial research activities while in training.

Research is a tool that is under-utilized and neglected; this has retarded improvement in the quality of health in developing countries. Research can provide solutions that may already be available and affordable. It can also generate new ideas for better understanding of issues and for fresh interventions. Biomedical and clinical research is constantly being carried out in Ghana but measures to strengthen the capacity are often modest in scale.

Globally the demographic transition of countries from developing to advanced ones plays a major role in selecting the types of research undertaken in these countries. Pre-transitional infections and parasitic diseases are important. Post-transitional problems such as AIDS, substance abuse, and occupational health hazards cause significant morbidity and mortality.

Research into identification and modification of risk factors is necessary for the post transitional diseases such as diabetes, hypertension and coronary artery diseases.

Research enhances improvement in reproductive health including family planning and safe sex, prevention of maternal mortality and the promotion of child survival and development. Technological research, policy and socio-behavioral research and health system research are all important for development.

Research is needed into micronutrient deficiency (vitamin A, iodine and iron). Applied research on essential drugs is needed for us to evaluate the impact of pharmaceutical policies on drug use patterns, define the economic and clinical scope of particular drug use problems, delineate the motivations and incentives among providers and consumers for misuse of pharmaceuticals, determine the most efficient and cost effective regulatory, managerial and educational interventions for promoting effective drug use.

Behavioral health in developing countries must be given its deserved priority in the considerations of national governments and the international funding community.

We need rigorous and cost-effective methods for analysis of health research for health improvement by using new and more successful intervention technologies and strategies as has been applied to polio vaccination for example.

Less -costly inputs and interventions to achieve good health such as the use of ORS, cheaper strategies of treatment such as the ambulatory method of treatment of tuberculosis (DOTS), new and powerful strategies such as the use of community health workers backed by a few well-trained health professionals to extend primary health care to rural villages represent more efficient ways to deploy resources to identify and target groups of people who are at risk of developing a particular disease.

The WHO in collaboration with other agencies such as UNICEF, UNDP and the World Bank continue to support research efforts world -wide. The Wellcome Trust (for Medical and Veterinary research), the Carnegie Corporation (for Strengthening human resources), the Ford Foundation (for Reproductive Health) and the Sasakawa Memorial Health Foundation (for Leprosy and Guinea worm) have been very helpful in many research efforts in these specialized areas of health.

In Walks “Maternal and Fetal Medicine” (MFM) subspecialty

We welcome on board the new subspecialty of MFM which is being hosted by the Faculty of Obstetrics and Gynaecology of the GCPS. It has been the result of a collaborative effort of the members of the faculties at KBTH and KATH and some external faculties and fellows. We have received a lot of encouragement from Prof Tim R. B. Johnson of the University of Michigan (Ann Arbor, USA); Prof Heather Scott (University of Halifax in Canada) has also shown a lot of interest in the MFM programme in Ghana. GCPS will have to formalize these arrangements as early as possible. The contacts will help in the training of fellows in research and the development of innovations in the subspecialty. The strategic plan of the GCPS should make it possible for fellows to imbibe new teaching and learning models and use research facilities that may not be available in Ghana. Similar to the Office of Research, Innovation and Development (ORID) of the University of Ghana, GCPS can acquire a “Grant Management” software to help in the efficient and effective research management services. One expects the GCPS to develop the capacity to manage intellectual property and technology transfer, ethics and research dissemination and to seek external funding for research.

Reference

University of Ghana Research Report 2013/2014

J.D. Seffah
Editor-In-Chief

COMMENTARY

ANTENATAL ULTRASOUND

The use of ultrasound in antenatal care has increased significantly worldwide over the last 20 to 30 years. Currently, the International Society for Ultrasound in Obstetrics and Gynaecology (ISUOG) recommends a mid-trimester Ultrasound to help confirm pregnancy-dating, number of fetuses, placental location and identify any congenital malformations. If resources and expertise are available, an early Ultrasound at 11 to 13 weeks is also recommended to further improve accuracy of pregnancy dating and early screening of congenital malformations. While first and second trimester Ultrasounds alone have not been shown to decrease perinatal mortality, information provided from these scans can be helpful to organize management plans for the pregnancy, including twin pregnancies and abnormal placentation. In addition, more accurate dating with Ultrasound is known to decrease rates of post-date induction of labour and rates of Caesarean secton. It can also assist with the identification of lethal congenital anomalies and abnormal fetal growth and add to the assessment of fetal well-being.

Over the last 10 years, Ghana has worked hard to decrease the neonatal mortality rate from 33.6 per 1000 live births in 2005 to 26.9 per 1000 live births in 2016. Despite this decrease, the 4th Millennium Development Goal to reduce child mortality by 2/3 has not been met nationwide. The 3rd Sustainable Development Goal has a new target of decreasing the neonatal mortality rate to 12 per 1000 live births by 2030. Given the top causes of neonatal mortality in Ghana include congenital anomalies, complications of prematurity and intrapartum complications including stillbirth; Ultrasound is a tool used in Obstetrics to identify some of these at-risk fetuses. Improved Ultrasound surveillance of these fetuses including use of Umbilical artery Doppler and Biophysical profiles, may help to achieve these goals by 2030.

Korle bu Teaching Hospital has recently launched a Fetal Assessment Centre within the Obstetrics department. Currently, the unit consists of one Ultrasound machine, and one CTG machine. There is at the moment a separate Cardiotocography Unit which was out doored in 2010 and efforts are being made to integrate the activities of this Unit with the Fetal assessment Centre. I recently had the opportunity to travel to Accra from Halifax, Canada, for a two-week period to conduct lectures and hands-on teaching within the Ultrasound unit. This opportunity was afforded to me through a growing partnership between Korle Bu Teaching Hospital, the University of Ghana and Dalhousie University in Halifax. Through further training and education, the goal is to expand and improve the quality of Ultrasounds provided at Korle bu Teaching Hospital and augment maternal fetal medicine training within the Department of Obstetrics and Gynaecology. Part of this initiative is to assist with the development of local guidelines for Ultrasound assessments including standardized training, appropriate timing and essential components of the Ultrasound assessment. With improved and consistent Ultrasounds, performed in a timely fashion by skilled care providers, improved maternal and neonatal outcomes may be realized. Another area we hope to invest resources within the centre is in the area of Simulation which we believe will improve care and outcome.

The vision of this Fetal assessment Centre is to grow into a Fetal assessment and treatment centre where a wide range of interventions could be done to optimize fetal outcome and reduce neonatal morbidity and mortality. We are hopeful that this centre with assistance from our Partners will provide the appropriate milleu for the training of maternal fetal medicine specialists for the country.

Christopher Nash MD, MSc, FRCSC
Jerry Coleman MBcHB, FWACS, CHS

ORIGINAL ARTICLES

THE IMPACT OF ROTAVIRUS VACCINE ON DIARRHEAL DISEASES AMONG CHILDREN UNDER FIVE YEARS: A RETROSPECTIVE ANALYSIS OF DATA FROM 2012 TO 2015 IN THE YILO KROBO MUNICIPALITY OF GHANA

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Abstract

Introduction: Diarrhea is an important childhood disease with high morbidity and mortality among children under 5 years of age in developing countries such as Ghana. Rotavirus vaccine was introduced in Ghana in 2012 to reduce the incidence of diarrhea among children in Ghana. The objective of the study is to assess the impact of rotavirus vaccines on the burden of diarrheal diseases among children under five years reported in the Yilo Krobo Municipality from 2012 to 2015.

Methods: A retrospective analysis of routinely collected and reported data on the monthly outpatient department (OPD) morbidity returns and vaccination reports from health facilities in the Yilo Krobo Municipality was done.

Results: The burden of diarrheal diseases in children under five years declined from 2012 to 2014 with a slight increase in 2015. Diarrhea formed 9.71% of OPD cases in children under five years in 2012 with a reduction to 7.73% between 2013 and 2015.

Conclusion: The rotavirus vaccine has had some impact on the incidence of diarrheal diseases reported at the outpatient departments.

Key Words: Rotavirus vaccines, Diarrhoea, Impact, Yilo Krobo, Ghana

Introduction

The Expanded Program on Immunization (EPI) was launched in 1978 with six vaccines: oral Polio, Measles, Diphtheria-pertussis-tetanus (DPT) and Bacillus Calmette-Guerin (BCG) for children under one year and Tetanus toxoid (TT) for pregnant women. These vaccines were introduced to reduce the morbidity and mortality of vaccine preventable diseases. Outreach, static and campaign strategies were used to reach the population[1]. Ghana introduced the Pneumococcal and Rotavirus vaccines in April 2012 as part of its (EPI) to prevent and reduce pneumonia and diarrheal diseases respectively.

Immunization is one of the ways of preventing diseases especially among children and has contributed to the reduction of childhood diseases. Developing countries contribute about 95% of the deaths in children under five years globally. Seventy percent (70%) of these deaths can be prevented by immunisation[2]. When many individuals are vaccinated, there can be protection for all through herd immunity[3].

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Conflict of Interest: None Declared

The success of the initial vaccines in reducing morbidity and mortality provided enough evidence to further introduce new vaccines to cater for other diseases. Ghana began the process to introduce the pneumococcal and rotavirus vaccines as well as a second dose of measles in 2009[1].

Rotavirus is the most common pathogen causing diarrhoea[4] in children under one year leading to dehydration and death. For childhood diarrhea hospitalizations, rotavirus accounted for 22% in 1986 compared with 39% in 2004[5]. To prevent diarrhea, two doses of the rotavirus vaccine are required for children at 6 and 10 weeks of age.

With the introduction of rotavirus vaccine as part of the routine immunization program, the burden of diarrheal diseases is expected to decline. However, this has not been established since no study has been done to determine the impact of the vaccine. This study therefore, sought to look at the effect of the vaccine on the clinical burden of the disease after its introduction in the Yilo Krobo Municipality.

Objective

To assess the effect of rotavirus vaccines on the burden of diarrheal diseases among children under five years of age in the Yilo Krobo Municipality from 2012 to 2015.

Methods

Study Area

The Yilo-Krobo Municipality is one of the twenty-six Municipals in the Eastern Region of Ghana, strategically located in the south eastern part of the country. It shares boundaries with the Lower and Upper Manya-Krobo Municipalities in the North and East, Dangbe West and Akwapim North Municipalities in the South, New Juabeng, East Akim and Fanteakwa Municipalities in the West. The Municipality covers a land area of 805 square kilometers with Somanya as the Municipal capital.

The 2010 Housing and population Census indicates an estimated 2015 population size of 97,466 giving the number of children under five years as 13,255.

Study Design

A retrospective analysis of routinely collected and reported data from health facilities in the Yilo Krobo Municipality to the district health information system 2 (dhim 2) platform of the Ghana Health Service was done.

Data Source and Study Variables

Routine service data including morbidity and immunization service data entered into the district health information systems (dhim 2) platform, which is the main reporting portal of the Ghana Health Service was extracted. Data extracted was between January 2012 to December 2015 for diarrheal diseases as well as immunization data. The data was extracted from the monthly morbidity report and monthly EPI report in the dhim 2.

Diarrheal diseases were the main conditions studied. The diagnosis of this condition in the health facilities within the Municipal was based on Integrated Management of Childhood Illness protocol (IMCI)[6]. Demographic characteristics like age, sex and geographic location were among the study variables.

Data Analysis

The data on outpatient cases of diarrhea in children under 5 was extracted into Microsoft Excel, 2013 version. It was also used to group and summarize the OPD morbidity form and monthly vaccinations. The proportion of diarrheal diseases on total Outpatient conditions was calculated to know the burden/prevalence of the condition from 2012 to 2015. This was compared over the period to determine increase or decrease in burden of diarrhea. A simple correlation analysis of diarrhea cases seen was run to determine the relationship between the years and cases recorded. This was done using Statistical Package for Social Sciences (SPSS v25)

The trend and vaccine coverage rates for rotavaccine was also extracted and calculated from the monthly EPI (vaccination) report on the dhim 2 platform. Vaccine coverage rates were determined with number of doses administered per number of targeted children under one year for the period. As stated, the number of doses administered was taken from the vaccination report whereas the targeted children were from the demographic data of the Yilo Krobo Municipality.

Ethical Considerations

Data used in the study is available on the Ghana Health Service dhim 2 system of reporting data. Discussions were also held with the health authorities in the Municipality before using the data for the study.

Results

As shown in table 1 diarrheal diseases contributed 2598 (9.71%) out of 26707 new cases in children under five in 2012 compared with 3045 (8.21%) out of 37064 in 2013. This declined further to 2517(7.21%) out of 34884 new cases in 2014. In 2015, diarrheal diseases were 2867 (7.74%) out 37006 (Refer to table 1).

Table 1. Total Diarrheal cases from 2010 to 2015

Year	Diarrhea (<5)	Total <5 Conditions	% Diarrhea (<5)
2012	2598	26707	9.71
2013	3045	37064	8.21
2014	2517	34884	7.21
2015	2865	37006	7.71

The district recorded high immunization coverages as shown in table 2 below.

Table 2. Four year trend of immunization coverage for rotavaccine

Year	1st doses adm.	% cov.	2nd doses adm.	% cov.
2012	2174	59.35	1885	51.46
2013	3892	104.06	3960	105.88
2014	3982	104.30	4074	106.71
2015	4550	116.70	4606	118.13

Trend of Diarrhea and distribution

The study showed a general trend in reduction of diarrhea cases as shown in figure 1.

The review showed diarrhea in children under 1 year in 2012 to be 13.79%. This reduced to 10.19% in 2013. Amongst children 1 – 4 years, diarrhea was 8.86% in 2012. This reduced to 7.82%, 6.62% and 6.85% in 2013, 2014 and 2015 respectively (figure 2). Diarrheal diseases among males in 2012 was 10.37% and 9.04% among females. In 2013, diarrhea among males was 8.65% and 7.75% in females reducing to 7.35% in males and 7.07% in females in 2014. There was an increase in 2015 of 7.91% in males and 7.56% in females.

Rural-Urban Differences

There was consistent reduction of diarrhea cases in the rural areas starting with 10.5% in 2012 to 9.9%, 8.5% and 7.9% in 2013, 2014 and 2015 respectively whereas there was a slight increase in 2015 in the urban areas. Refer to fig 3

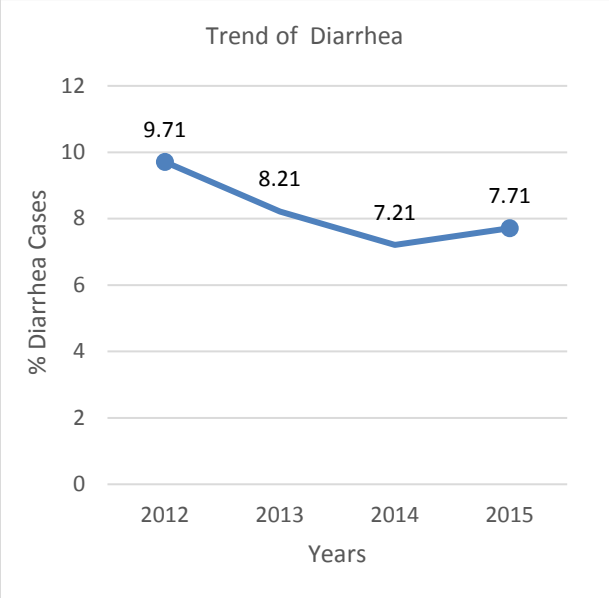

FIG. 1 TREND OF DIARRHOEA DISEASES, 2012 - 2015

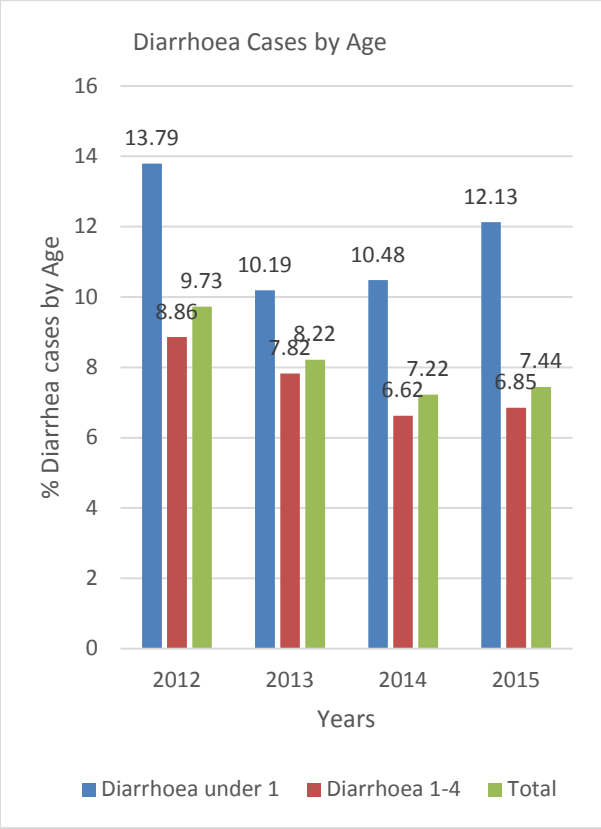

FIG 2. DIARRHEA CASES BY AGE, 2012 - 2015

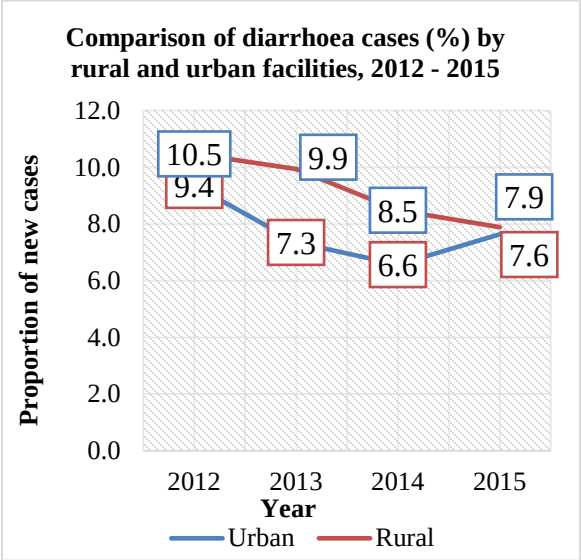

Fig. 3 Diarrhoea in urban and rural areas, 2012-2015

Discussion

The introduction of rotavirus vaccine reduces the mortality and morbidity of diarrhoea[7,8], and it's expected that, a decline in diarrhea diseases seen at OPD should happen especially among children under five. From the analysis of the data for the Yilo Krobo municipality, diarrheal diseases were 9.73% of total cases seen in children under five in 2012 and declined to 7.22% in 2014. There was however, an increase to 7.74% in 2015. Amongst the diarrhea diagnoses, males were mostly affected. Between 2012 and 2015, diarrheal diseases at OPD amongst male children under five was 4.3% and 3.6% in females. Also, children under one year were more likely to be diagnosed of diarrhea compared with those 1–4 years. From the data analyzed, 11.06% of children under 1 were treated for diarrhea compared with 7.27% among those 1–4 years.

As indicated earlier, the burden of diarrhea in children under five years kept declining from 2012 to 2014 with slight increase in 2015. However, there were consistent reductions in diarrhea cases in rural areas over the four year period and the slight increase in 2015 was as a result of increase in urban areas. The impact of rotavirus vaccine on diarrhea mortality and morbidity depends on vaccine effectiveness as well as vaccine administration in accordance with the recommended schedule[8]. Quality immunization services with valid doses in both rural and urban areas will result in reduction of diarrhea diseases in both areas, however differences in immunization services in these areas will result in reduction in the disease burden in one area with increases in the other areas. The incidence among children under one and 1-4 years were 13.79% and 8.86% in 2012 which reduced to 10.96% and 7.11% in 2013 – 2015. The reduction in the burden of diarrhea cases is consistent with other studies conducted elsewhere. A study conducted in Brazil showed a huge

decline in hospitalizations and about a 50% decrease in deaths in children under one year and 32.9% decrease in older children[9] after the introduction of Rotavirus vaccine. Also, in a similar study conducted on the effect of rotavirus vaccine on diarrhea morbidity, there were reductions in hospitalizations due to rotavirus infections and diarrhea episodes. The effectiveness of the vaccine against rotavirus infection is demonstrated by significant reduction in child morbidity and mortality in low-income countries if implemented appropriately[10].

A simple correlation analysis between the year and diarrhea burden was -0.830 which denotes that diarrheal diseases generally reduced with time and this agrees with several studies that indicates the reduction of diarrheal diseases following introduction of rotavirus vaccine. Studies have showed reduction in diarrhea diseases, hospital admissions and mortalities from diarrhea diseases after introducing rotavirus vaccine .[8,9]

The rotavirus vaccine also recorded high coverage and drop-ins in the Municipality over the three years period (table 2).

It is known that when immunization rates for the introduction of these vaccines, for example Rotavirus vaccine and Pneumococcal Conjugate Vaccine are high, the carriage of Rotavirus and *Streptococcus pneumoniae* decreases significantly[11] and therefore the disease condition reduces. It therefore, becomes crucial for immunization practices to be done properly to ensure that targeted children receive potent vaccines at the right intervals or timing through the right route of administration to ensure reduction in vaccine preventable diseases in children and improve child survival.

Limitations of Study

The review was based on outpatient data reported by health facilities. Other important factors like regular change and modification of data collection and reporting forms during the period posed a limitation, however data officers were trained on the use of the new data collection forms to reduce the limitation.

Conclusion

Vaccination is an important means of preventing diseases especially in children. The rotavirus vaccines were introduced to prevent and reduce the burden of diarrheal diseases. Immunization rate for the municipality was high for rotavirus and the data demonstrated reduction in diarrheal diseases seen at the OPD in Yilo Krobo Municipality following the introduction of the rotavirus vaccine

Acknowledgement

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MATERNAL AND FETAL OUTCOME OF NORMAL AND ABNORMAL CARDIOTOCOGRAPHIC FINDINGS AT A TERTIARY HOSPITAL IN GHANA

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Abstract

Background: Cardiotocography (CTG) provides important information about the interaction between fetal cerebral and cardiac activities which are both modified by hypoxia. The duration and severity of hypoxia and associated biochemical abnormalities all influence the manifestations of fetal heart rate abnormalities. Antenatal fetal heart rate monitoring with CTG has potential in preventing intrauterine fetal death.
Aim: The aim of the study was to compare the maternal and fetal outcome of pregnancies with normal and abnormal antepartum CTG tracings.
***Methodology*:** This descriptive retrospective review compared 200 consecutive women with normal and 200 with abnormal CTG tracings**.** The study lasted six months and spanned a period of time from beginning of January to end of June 2011. Demographic, pregnancy and delivery outcome data were retrieved from participants' charts and simple descriptive analysis was performed. Means and their standard deviations of continuous variables were calculated and difference between group mean were compared using the student t-test. Categorical variables were summarized as proportions and the chi-square test used to test for difference between groups. A p-value < 0.05 was considered statistically significant.
Results: Women with normal and abnormal CTG tracings were comparable in their demographic characteristics. Abnormal CTG tracings were associated with higher rate of preterm delivery (38.8% vs 18.8%, p = 0.001), caesarean section (77.9% vs 47.0%, p = 0.001) low birth weight (25.5% vs 9.1%, p = 0.001) and NICU admissions (36.5% vs 17.6%, p = 0.001). There was no difference in Apgar score or stillbirth rate between the two groups. Pregnancies with abnormal tracing were delivered about a week earlier than those with normal tracing**.** (37.8±2.9 vrs 38.3±2.6, p=0.001). Longer interval between tracing and delivery was associated with stillbirth.
Conclusion: Abnormal antepartum CTG tracing was associated with higher preterm delivery, caesarean section, low birth weight and NICU admission. Longer interval between abnormal tracing and delivery was associated with higher stillbirth rate. Active and adequate resuscitation of babies with abnormal tracing can reduce perinatal morbidity.

Key Words: Childhood, malignant, tumours, orofacial, Ghana

INTRODUCTION

Cardiotocography (CTG) is a commonly used test for antepartum and intrapartum fetal health monitoring in high income countries. This test provides information about the fetal cerebral and cardiac activities, which are modified by hypoxia. Antenatal fetal assessment with the Non Stress Test (NST) was introduced into the United States in the 1970s[1]. The normal baseline fetal heart rate tracing results from complex sets of interactions that are regulated by intrinsically controlled mechanisms.

To produce a normal fetal heart rate (FHR) pattern, the fetal heart must possess intact electrical conduction pathways, myocardial neuro-hormone receptors, sympathetic and parasympathetic reflex arcs, and inherent contractility[2].

NST reactivity occurs through an autonomic neural linkage between peripheral fetal heart activity and midbrain cardio-regulatory centers, which strengthens as the fetus matures. Fetal heart rate patterns that first signal cellular hypoxia and acidosis depend on the duration and severity of these biochemical abnormalities[3].

However, these patterns may not be uniformly expressed by all compromised fetuses. FHR patterns associated with pre-terminal fetal asphyxia may exhibit relatively fixed FHR baselines, loss of FHR variation, disappearance of accelerations, or the appearance of spontaneous late FHR decelerations[4].

At term, nearly 90% of fetal movements elicit reactive accelerations[5]. Current test criteria typically consider an NST to be reactive if there are two accelerations exceeding 15 beats per minute amplitude and 15 seconds duration in a 20-minute window for term pregnancies and 10 beats per minute amplitude and 10 seconds duration for gestational ages below 32 weeks[6].

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Conflict of Interest: None Declared

Generally, performing an NST is not helpful if gestational age or estimated fetal weight is below the institutional threshold for survival. Non-reactivity may be associated with three differing scenarios which fail to meet reactivity criteria. This includes progression from the presence of accelerations of inadequate amplitude or frequency through the absence of accelerations in the presence of fetal movements to the complete absence of accelerations and fetal movements. This uncoupling phenomenon has been well characterized by several groups[7,8]. Non-reactivity may be associated with prolonged fetal sleep states, immaturity, maternal ingestion of sedatives, and fetal cardiac or neurologic anomalies[9].

Cumulative studies of NST performance suggest a false-negative rate of 0.3% within 1 week of a reactive NST and a false-positive rate of 50%[4]. False positive results may lead to unnecessary surgical interventions. False-positive test results in iatrogenic prematurity. This risk must be weighed against the risk of delaying delivery of a potentially compromised infant.

The interval between tests should be driven by the specific high-risk conditions of concern and the level of concern for fetal well being. Current data suggest that intervals between tests should be no greater than 7 days[10] given that the predictive power of the NST declines as the test interval lengthens. Recently, it has been shown that most NST parameters are reliable within 48 hours[9,11].

Fetal heart rate abnormalities, however, are infrequently associated with long-term adverse outcomes. Fetal heart rate patterns are classified as category I, category II and category III based on whether they are seen to be normal, indeterminate or abnormal respectively[12]. Category II patterns including fetal tachycardia, bradycardia and late decelerations but with good short term variability and requires further evaluation to exclude fetal acidosis. Category III patterns require emergency intrauterine fetal resuscitation and immediate delivery. Differentiating between these categories of fetal heart rate pattern is necessary for triage and management decisions.

Although electronic fetal monitoring (EFM) is currently used in more than 80% of births in the United States, there is controversy regarding its efficacy[13,14]. Various studies have evaluated the relationship between electronic FHR monitoring and neonatal outcome[15]. These studies noted a decrease in the incidence of seizures in fetuses assessed with EFM compared with fetuses monitored with auscultation[16]. However, EFM was not shown to be more effective than intermittent auscultation in lowering perinatal mortality rates[16,17]. Furthermore, these studies identified an increase in operative vaginal deliveries and caesarean sections in patients monitored with EFM during the intrapartum period[17].

While cardiotocography has been suggested as a theoretically effective intervention in low-resource healthcare settings[18], its efficacy and feasibility has not been assessed in these settings. Cardiotocography has recently been incorporated into management of high risk pregnancies in the department, however, there has not been any evaluation of this tool and its impact on maternal and fetal outcome. This baseline study will provide preliminary data based upon which future studies can be designed.

Methodology

This is a descriptive retrospective cohort study of four hundred (400) women who had non-stress test (NST) as part of their antenatal surveillance.

The study was performed at the maternity unit of the Korle-bu Teaching hospital, Accra, Ghana. The unit is the biggest tertiary obstetric referral center in Ghana where more than 80% of the patients are high risk clients referred from other health institutions. The center delivers about 10,000 women annually. In spite of its high risk obstetric population antenatal and intrapartum fetal monitoring did not include CTG until the late 2010.

The CTG tracing of women who were referred to the perinatal assessment center (PAC) for antenatal NST between January and June 2011 were retrieved. We included two hundred consecutive women with normal (category 1) and two hundred with abnormal (category II and III) last NST report before delivery for this review. We excluded pregnancies with gestation less than 28 weeks, multiple gestations and known gestations with congenital fetal anomalies.

Interpretation of CTG was done by two dedicated consultants independently based on the National Institute for Health and Clinical Excellence (NICE) guidelines 2001[19]. In few cases where their reports differ, they met and resolved the difference by consensus.

The findings included baseline fetal heart rate, short and long term variability, acceleration, early, variable, prolonged or late deceleration and contractions.

Advice was given to referring doctors as to the need to review the clinical picture, do further testing or deliver. In the event of an abnormal NST report, the test was either repeated within 24 to 48 hours, Biophysical profile or Umbilical Doppler velocimetry was recommended and for category III results immediate delivery was advised. Arrangement was made for active resuscitation by the neonatologist for babies with such reports. For this study, category II and III tracings were both classified as abnormal or non-reactive and category I as normal or reactive. The study utilized stored data of NST tracings from the perinatal assessment center database and delivery outcome information from participants' charts. All patient information was anonymized and completely de-identified prior to analysis.

Pregnancy and neonatal data were obtained from the patients' folders and the findings were correlated with the FHR tracing reports. Maternal demographic and pregnancy characteristics, indications for requesting for NST, gestational age at delivery, mode of delivery,

as well as delivery outcome information were collated. Statistical analysis was carried out using SPSS version 17 (SPSS Inc, Chicago,IL). Means and their standard deviation were calculated for continuous variables and proportions were also estimated for discreet variables. The differences between outcomes for patients with normal and abnormal NST results were compared using the t- test for continuous variables and chi-square test for non continuous variables. The differences were considered significant at p value < 0.05.

Ethical consideration

Ethical approval was granted by Ethics Committee of the University of Ghana Medical School and permission to carry out the study was granted by the Head of the Department of Obstetrics and Gynecology, Korle-Bu Teaching Hospital. We used stored NST data and supplemented with delivery information from patients' charts. All patient information was completely de-identified before analysis.

Results

The age of study participants ranged from 18-45 years with mean age of 30.4 ±5.7 years. More than half (52.9%) of the women had more than basic education, defined as nine years of formal education. Parity of the mothers ranged from 0 - 6 with a mean parity of 1.2 ± 1.7. The average weight of the women at booking was 72.3 ± 16.2kg. The mean gestational age at booking was 17.6 ± 7.1weeks, whilst the mean weight before delivery was 78.93±6.5kg.

All baseline characteristics including age, parity, gestational age at booking, maternal weight and height as well as last weight before delivery were similar for both groups. 'Table 1'. There was a significant difference in gestational age at delivery when reactive and non reactive groups were compared

The commonest indication for initiating a non-stress test was postdate followed by pre-eclampsia and gestational hypertension. Postdate as an indication is more likely to show significant reactivity on NST than Non reactivity when compared to other indications such as sickle cell disease, premature rupture of membranes, diabetes and pre-eclampsia. 'Table 2'.

Table 1. Demographic and baseline characteristics of women with antenatal non-stress test (NST)

Variable	Total Mean±SD	Non-reactive NST mean±SD)	Reactive NST mean±SD	p-value
Age /yrs (n=400)	30.4±5.7	30.7±5.8	30.0±5.5	0.179
Parity (n=395)	1.2±1.7	1.2±1.4	1.1±1.9	0.935
Weight at booking/kg (n=316)	72.3±16.2	71.1±15.6	73.3±16.7	0.224
Height of women/m (n=197)	1.58±0.13	1.59±0.08	1.57±0.18	0.218
Gestational age at booking/weeks (n=315)	17.6±7.1	18.1±7.2	17.1±6.9	0.223
Education status (n = 395) (%)				
Basic	186(47.1)	84(42.9)	102(51.3)	0.095
Post basic	209(52.9)	112(57.1)	97(48.7)	
GA at delivery (wks n = 393)	38.3 ± 2.6	37.8 ± 2.9	38.9 ± 2.1	0.001
Last weight before delivery (kg) n=313)	78.9± 16.5	78.0 ± 16.3	80.1 ±16.6	0.223

GA = Gestational Age

Table 2: Reasons for requesting non-stress test (NST)

Indication	Non Stress Test result		P-value
	Non – Reactive n (%)	Reactive n (%)	
Postdate	51 (43.2)	67 (56.8)	**0.016**
Pre-eclampsia	37 (57.8)	27 (42.2)	0.404
Gestational hypertension	30 (50.8)	29 (49.2)	0.907
Sickle cell disease	12 (60.0)	8 (40.0)	0.636
IUGR	10 (52.6)	9 (47.4)	0.981
PROM	13 (72.2)	5 (27.8)	0.094
Diabetes	12 (70.6)	5 (29.4)	0.140

IUGR? PROM?

Table 3: Pregnancy outcome among women with normal and abnormal antenatal non-stress test (NST) tracing

Obstetric parameter	Total n (%)	Non-reactive n (%)	Reactive n (%)	p-value
Mode of delivery				
Vaginal	150(37.6)	44(22.1)	106(53.0)	0.001
Cesarean	249(62.4)	155(77.9)	94(57.0)	
Gestational age at delivery				
Preterm (<37wks)	113(28.8)	76(38.8)	37(18.8)	0.001
Term	280(71.2)	120(61.2)	160(81.2)	
Tracing to delivery interval/days	-	1.91±1.65	2.85±1.89	0.001
Birth weight /g				
Low birth weight (<2500)	69(17.4)	51(25.5)	18(9.1)	0.001
Normal birth weight	328(82.6)	149(74.5)	179(90.9)	
NICU admissions	108(27.1)	73(36.5)	35(17.6)	0.001
Apgar scores at 1 minute				
Abnormal (<7)	100(25.3)	58(29.1)	42(21.3)	0.073
Normal (≥7)	296(74.7)	141(70.9)	155(78.7)	
Apgar score at 5 minutes				
Abnormal (<7)	34(8.6)	19(9.5)	150.56(7.6)	0.492
Normal (≥7)	362(91.4)	180(90.5)	182(92.4)	
Stillbirth	29(7.2)	16(8.0)	13(6.5)	0.563
Birth weight/g (n=397)	3066±686	2938±721	3196±624	0.001
Length of baby/cm (n=376)	48.4±4.6	47.6±5.3	49.1±3.5	0.001
Head circumference /cm (n=376)	33.5±2.8	33.0±3.4	33.9±2.1	0.003
Chest circumference/cm (n=376)	32.1±3.3	31.6±3.8	32.7±2.7	0.002
Placenta weight /g (n=363)	678.7±15 3.1	670.5±149. 0	687.2±157. 3	0.301

Table 4: Relationship between tracing to delivery interval and fetal outcome

Fetal outcome	Numbers N	Interval from tracing to delivery/days Mean±SD	p-value
Live birth	290	2.30±1.75	0.027
Stillbirth	8	2.75±1.80	
Early neonatal death	1	7.0	
Total	299	2.33±1.81	

There was a significant difference in the gestational age at delivery for both reactive and non-reactive groups. P=0.001. Women with abnormal NSTs were delivered about one week earlier than those with normal tracing. There was also a higher proportion of preterm delivery, defined as delivery before 37 weeks, among women with abnormal tracing (38.8% vs 18.8% p< 0.001). The average interval between normal tracing and delivery was 2.85 days which was significantly longer than the 1.91 days when NST tracing was abnormal. Caesarean delivery rate was much higher in women with abnormal tracing (77.9% vs 47.0%, p<0.001). There was a higher incidence of low birth weight (defined as birth weight < 2500g) when NST was abnormal (25.5% vs 9.1%, p<0.001) compared to those with normal NST report. 'Table 3'. While NICU admission rate was higher in the babies with abnormal tracing (36.5% vs 17.6%, p = 0.001), there was no difference in the Apgar scores at 1 and 5 minutes in group with abnormal or normal NST report. Babies with abnormal tracing generally had smaller features than those with normal tracing. There was no difference in the stillbirth rate between the two groups. On the whole, live births had a shorter interval between their last NST tracing and delivery compared with babies that were still born 'Table 4'.

Discussion

This review showed that women who had normal or abnormal antenatal non-stress test were similar in their demographic characteristics. Pregnancies complicated by pre-eclampsia, sickle cell disease, diabetes mellitus, PROM and IUGR were associated with higher incidence of abnormal NST reports. Abnormal NST tracing was also associated with delivery at a lower gestational age,

shorter tracing to delivery interval, higher caesarean section and preterm delivery rates. Abnormal NST report was associated with higher incidence of low birth weight and NICU admission.

In a study done in Bangladesh, out of 100 abnormal CTG, there was significantly higher caesarean delivery, lower Apgar score, higher requirement for neonatal resuscitation and admission at neonatal unit and higher perinatal death among the abnormal CTG group (20.) Similarly, another study from Nigeria reported higher incidence of caesarean delivery, high perinatal mortality and small for gestation among pregnancies with abnormal NSTs (21). This study also shows a higher caesarean delivery and NICU admission rate among babies with abnormal CTG tracing. There was, however, no difference in Apgar scores and stillbirth rate. This study also showed a significantly shorter waiting time between abnormal tracing and delivery. Overall, pregnancies with abnormal tracing were delivered about a week earlier than those with normal tracing due to the heightened concerns by both mothers and caregivers. This resort to earlier delivery may account for the higher incidence of prematurity and low birth weight among the abnormal NST group.

In a prospective randomized study of delivery outcome with 569 CTG tracings among 300 patients, non-reactive tracing was associated with higher incidence of stillbirths and neonatal deaths (22). Even though this study did not report on neonatal death, stillbirth rate did not differ between the two groups. This is probably due the prompt delivery of babies with abnormal tracing. While these babies were not stillborn, a higher proportion of them were admitted to the NICU. It may, therefore, be useful to follow up these babies at the NICU and even beyond the neonatal period in order to assess the impact of these abnormal tracing well after delivery.

The high incidence of prematurity and preterm delivery in the non-reactive group may be a reflection of their immature cardio-respiratory center of the brain and not necessarily a sign of compromise. Mature midbrain cardio-respiratory center, sympathetic and parasympathetic reflex arcs are required for appropriate fetal cardio-respiratory response to fetal movements. At term, nearly 90% of fetal movements elicit reactive acceleration (5).

Even though there was no statistically significant difference in the Apgar scores between the two groups at 1 and 5 minutes, 29.1% of the babies who had abnormal Apgar score at 1 minute had abnormal tracing while 21.3% had normal tracing. A low Apgar score at 5 minutes was recorded for 9.5% of babies in the abnormal tracing group and 7.6% in the normal tracing groups. The fewer number of babies with low Apgar score at 5 minutes is a reflection of active neonatal resuscitation done because adequate preparation was made for the fetuses that were perceived to be compromised intrapartum.

In a study to assess the effect of prompt intervention after a non-reactive test, a ten-point scoring system was used to assess 2770 antepartum cardiotocograms obtained in 405 high risk pregnancies (23). A score of 8 to 10 reliably predicted good condition at birth in 95 percent of pregnancies which ended within 24 hours and in 88 per cent of those which ended after three or four days. Poor fetal condition with little chances of a normal outcome was recorded for delays longer than that unless the cause could be effectively treated. Similarly in this study longer delay between NST and delivery was associated with poor fetal outcome, especially stillbirth.

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Limitations of the study

This study only compared the fetal outcome of pregnancies with normal and abnormal tracings. There is limited information on the newborns beyond the delivery period. Further follow-up of these newborns even well beyond the neonatal period will be helpful in detecting the actual impact of an abnormal tracing on the life of the baby. Even though this study also lumped category II and III NST results together which theoretically can cause overestimation of the adverse outcome in the abnormal group, the numbers of patients with category III tracing were so small that they could not vary the overall effect. There is limited information on maternal outcome or the actual indications for delivery, especially for babies that were delivered prematurely. Maternal health could be a major deciding factor in terminating a pregnancy prematurely which could also affect the perinatal outcome of the baby and not merely due to findings from a NST tracing.

Conclusion and recommendations

This study showed that pregnancies with abnormal CTG are associated with higher incidence of preterm delivery, caesarean section, low birth weight and NICU admissions. Generally, these pregnancies are terminated about a week earlier than those with normal tracing. Though stillbirth rate did not differ between the two groups, longer duration between tracing and delivery was associated with higher still birth rate. Prompt response to abnormal CTG tracing is therefore necessary. This response should be in the form of further investigations such as biophysical profile and umbilical artery Doppler studies to ascertain the underlying cause of the abnormal tracing. This could reduce the incidence of intervention and reduce caesarean delivery and prematurity. Where urgent delivery is indicated, adequate preparation for active resuscitation will be necessary to improve perinatal outcome. Further investigations should prospectively look at how various management or interventions can improve the outcome of abnormal tracing and how maternal conditions impact these results.

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MODE OF DELIVERY AND CAESAREAN INDICATIONS AMONG WOMEN WITH HYPERTENSIVE DISORDERS IN PREGNANCY AT KORLE BU TEACHING HOSPITAL

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Abstract

Objective: To determine the relative proportions of vaginal and caesarean deliveries, and the common caesarean indications among women with hypertensive disorders in pregnancy (HDP).

***Materials and methods*:** A cross sectional study conducted at the Maternity unit of Korle Bu Teaching Hospital in Accra from 1st January to 28th February 2013.

***Results*:** A total of 368 women with HDP were recruited with 168 (45.7%) and 200 (54.3%) having caesarean and vaginal deliveries respectively. Regarding the caesarean delivery, 31 (18.5%) had gone into labour prior to the surgery whiles 137 (81.5%) were not in labour. Among the 368 women 68 (18.5%) had induction of labour out of which 46 (67.6%) achieved vaginal delivery. The risk of caesarean section was significanty higher in preeclampsia [(adjusted odds ratio 2.898 (1.741-4.824), p-value <0.001] and chronic hypertension [(adjusted odds ratio 2.474 (1.194-5.128), p-value =0.015] with reference to gestational hypertension. The Common caesarean indications among women with HDP were previous caesarean birth (26.2%), unfavourable cervix (22.6%), fetal distress (14.9%), failure to progress (10.7%), fetal malpresentation (9.5%), failed induction (7.1%) and placental abruption (3.0%). A total of 65 (17.7%) women with HPD had had a prior caesarean birth.

***Conclusion*:** This study has determined a high caesarean birth rate in women with HDP with the highest and lowest caesarean rates occurring in chronic hypertension and gestational hypertension respectively. The common caesarean indications among women with HDP were previous caesarean birth, unfavourable cervix, fetal distress, failure to progress, fetal malpresentation, failed induction of labour and placental abruption.

Key Words: Ccaesarean indications, preeclampsia, eclampsia, chronic hypertension.

Introduction

Hypertensive disorders are common medical complications in pregnancy and a significant cause of maternal-perinatal morbidity and mortality globally[1-3]. In Korle Bu Teaching Hospital (KBTH), where the current study was conducted, HDP are the leading cause of maternal deaths[4]. The management of these complications requires specialized care with consultant involvement to optimize both maternal and fetal outcomes because of their characteristic unpredictable nature and the potential for poor outcomes[2]. The mainstay of treatment of HDP involves close antenatal supervision of the maternal and fetal parameters with timely delivery to prevent progressive deterioration and subsequent morbidity and mortality[2].

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However, the timing and optimal mode of delivery in women with HDP including severe preeclampsia remain a major obstetric issue with varied opinions especially in preterm gestations[5,6].

Most international guidelines recommend vaginal delivery for preeclamptics at term[1,7] and recent studies recommend induction of labour (IOL) for these obstetric subgroup[6,8]. However, other researchers have demonstrated increased risk of failed induction of labour and caesarean section (CS) in preeclamptics[9]. Due to the controversies regarding the timing and optimal mode of delivery in women with HDP, varied caesarean rates with as high as 100% in preeclamptics have been reported[5]. Although CS is safer in modern obstetrics, it is associated with higher risks compared to vaginal delivery. Caesarean section is recommended when there is specific obstetric indication based on maternal or fetal factors and the decision for abdominal delivery should be individualized[1]. Common caesarean indications among women with HDP undergoing caesarean birth have previously been reported with varying frequencies and these include fetal distress, arrest of labour, previous caesarean birth and fetal malpresentation[6,10].

Initial attempt at achieving vaginal delivery is usually encouraged and recommended to avoid maternal

risks from CS, even in women with severe PE or eclampsia. It is important to emphasize that an immediate cure does not instantaneously follow delivery by any route, but severe morbidity is less common during the puerperium in women who achieve vaginal delivery[11]. Coppage and Polzin remarked that immediate caesarean delivery confers no benefit to women with severe preeclampsia and that no morbidity was minimized by abdominal delivery. They determined that gestational age and Bishop score assessment of the cervix did not influence the success rate for IOL in this high risk group[12]. Although prematurity may be of great concern in these patients Alanis et al did not find any adverse outcomes in preterm neonates following induction of labour[8]. In preeclampsia, delivery is always an appropriate therapy for the mother regardless of its severity or the duration of gestation but it may not be beneficial to the fetus. In determining the optimal mode of delivery in women with HDP especially severe preeclampsia it is, therefore, important to consider both maternal and fetal wellbeing to optimize the obstetric outcomes[1].

In Ghana, the differential mode of delivery and common indications for CS among women with hypertensive disorders in pregnancy have not yet been documented but clinical experience suggests relatively high caesarean rates among this obstetric subset. It was therefore imperative that the relative proportions of vaginal and caesarean deliveries as well as the common caesarean indications in women with HDP be studied in our indigenous clinical environment. The findings of this study would serve as evidence for implementation of appropriate guidelines to improve the obstetric outcomes of HDP in Ghana and other countries with similar clinical settings.

Subjects and Methods

This was a cross sectional study conducted at the Maternity unit of Korle Bu Teaching Hospital (KBTH), in Accra, Ghana from 1st January to 28th February 2013. This was part of a larger study to determine the maternal morbidity of hypertensive disorders in pregnancy[13]. Korle Bu Teaching Hospital is the largest tertiary hospital in Ghana and serves a population of approximately three million inhabitants. The Maternity unit conducts approximately 10,000 deliveries annually.

The inclusion criteria for the study consisted of all women with pregnancies complicated with hypertensive disorders receiving maternity services at KBTH. We excluded women with hypertensive disorders who delivered at a peripheral health centre, hospital or maternity home prior to the referral to KBTH. Multiple gestations were also excluded from the analysis to avoid their potential confounding effect on the mode of delivery.

The data collection was performed by the principal investigator and two other research assistants. The first part of the study involved baseline data collection on all the obstetric patients delivering at Maternity unit in KBTH. The baseline data collection involved identification of all women delivering at the two labour wards every morning from the admission and discharge books. The baseline data collection on all obstetric patients delivering at KBTH each morning was necessary to identify women whose pregnancies were complicated by HDP. The second part of the study involved tracing the women with HDP who had been admitted to the various maternity wards after delivery to extract the needed information from their medical records after delivery. In this study we report the results from initial part of the data collection which involved extraction of the required data from the medical records of the patients. The data obtained included socio-demographic and basic obstetric information such as parity and mode of delivery, gestational age at delivery and blood pressure at diagnosis of preeclampsia and gestational hypertension.

In this study, HDP were classified according to the classification system described by the International Society for the study of hypertension in pregnancy (ISSHP) including preeclampsia, gestational hypertension, chronic hypertension and preeclampsia superimposed on chronic hypertension[7]. Hypertension in pregnancy was defined as systolic blood pressure (BP) $\geq$ 140 mmHg and/or a diastolic BP $\geq$ 90 mmHg respectively. Proteinuria was determined using a semi-quantitative dipstick testing and proteinuria of 1+ was considered significant[1,14]. We obtained approval for study from the Ethical and Protocol Review Committee of the University of Ghana School of Medicine and Dentistry. Written informed consent was obtained from all the study participants prior to data collection.

The data obtained were entered into an Excel spread sheet (Microsoft company, USA) and analyzed using SPSS version 20.0(IBM, Armonk, NY, USA). Descriptive analysis was done and appropriate measures of centrality (mean) and dispersion (standard deviation) were calculated as well as percentages where appropriate. Cross tabulation was done to determine the percentages of the caesarean indications with respect to the various categories of hypertensive disorders in pregnancy. Logistic regression analysis was performed involving caesarean section and the hypertensive disorders to determine the odds ratio for caesarean delivery using gestational hypertension as a reference. A p-value of less than 0.05 was considered significant.

Results

Over the study period, 368 women with hypertensive disorders in pregnancy were included in the study out of which 168 were delivered via caesarean section resulting in a caesarean rate of 45.7%. Vaginal delivery occurred in 200 women representing 54.3%. Among those who had vaginal delivery 14 (7.0%) had instrumental (vacuum) delivery. Regarding caesarean delivery, 31 (18.5%) were in labour prior to the surgery whiles 137 (81.5%) had not gone into labour (Table 1). The mean arterial pressure at diagnosis (±SD) were

significantly higher in preeclampsia (127.15±16.27mmHg) compared to that of gestational hypertension (113.60±9.53mmHg), p<0.001. Among the 368 women with HDP, 159 (43.2%) had severe hypertension at diagnosis (defined as systolic BP 160mmHg or diastolic BP 110mmHg) out of which 83 (52.2%) had caesarean delivery.

The mean maternal age (in years ± SD) of women with HDP was 30.03±5.95. The median gestational age (in weeks ± IQR) at delivery among the women with gestational hypertension, preeclampsia, chronic hypertension and preeclampsia superimposed on chronic hypertension were 39.0 (IQR: 38.0-40.0), 38 (IQR 34.0-39.0), 39.0 (IQR 37.0-40.0) and 38.0 (IQR: 36.5-38.5) respectively. Most of the women with HDP (80.2%) were married and 284 (77.2%) had attained secondary education with 10.1% without any formal education.

The mean birth weights (± SD) of neonates born to mothers having preeclampsia, gestational hypertension, chronic hypertension and superimposed preeclampsia on chronic hypertension were 2.55±0.80kg, 3.06 ± 0.69kg, 3.40 ± 0.77kg and 2.94 ± 1.02kg respectively. The differences in birth weight were statistically significant between preeclampsia and gestational hypertension (p-value <0.001), preeclampsia and chronic hypertension (p-value <0.001) but not between preeclampsia and superimposed preeclampsia (p-value >0.5) or gestational hypertension and superimposed preeclampsia (p-value >0.5).

Most of the women with HDP were between 25 to 34 years and the distribution was similar between the two modes of delivery (Table 2). Teenagers constituted 7.5% and 3.0% among the vaginal and caesarean delivery groups respectively whereas those who were 40 years or more accounted for 2.5% and 7.1% respectively. Also, caesarean birth rates were highest in women with hypertensive disorders who were 40 years and above although they constituted the smallest proportion. The lowest CS rate occurred the in younger age group (≤19years) who had vaginal delivery rate of 75% (Table 2).

Generally, more than a third of the women with HDP were nulliparous with a proportion of 38.0% and 32.1% in vaginal and caesarean delivery categories respectively. Caesarean section rate was highest and lowest in women who were para 3 and para 0 (nulliparous) respectively (Table 3). Among the 368 hypertensive women 68 (18.5%) had induction of labour out of which 46 (67.6%) achieved vaginal delivery Table 4. Induction of labour was undertaken in 34 (24.3%), 25 (13.6%), 4 (17.4%), 5 (23.8%) women in preeclampsia, gestational hypertension, chronic hypertension and superimposed preeclampsia on chronic hypertension respectively.

The indications for caesarean delivery among all the hypertensive population are presented in Table 5. The common caesarean indications were previous caesarean birth (26.2%), unfavourable cervix (22.6%), fetal distress (14.9%), failure to progress (10.7%), abnormal presentation (9.5%), failed induction (7.1%) and placental abruption (3.0%).

Eclampsia occurred in 58 cases out of which 20 (34.5%) achieved vaginal delivery whiles 38 (65.5%) had caesarean section. Also, there were 16 cases of placental abruption with 11 (68.75%) and 5 (31.25%) delivering by vaginal and abdominal routes respectively. Regarding previous caesarean delivery, 21 (15.0%), 34 (18.5%), 6 (26.1%) and 4 (19.0%) women in the preeclampsia, gestational hypertension, chronic hypertension and preeclampsia superimposed on chronic hypertension groups respectively, had had a prior caesarean birth. Thus, a total of 65 women (17.7%) with HPD had a history previous caesarean section.

The risk of caesarean delivery was significantly higher in women with preeclampsia [unadjusted odds ratio with 95%CI: 2.701 (1.716-4.253), p-value <0.001] and chronic hypertension [(unadjusted odds ratio with 95%CI: 2.589 (1.324-5.061), p-value =0.005] compared to those with gestational hypertension. The increased risk of caesarean section was still significant for preeclampsia [(adjusted odds ratio 2.898 (1.741-4.824), p-value <0.001] and chronic hypertension [(adjusted odds ratio 2.474 (1.194-5.128), p-value =0.015] with reference to gestational hypertension after adjusting for maternal age, parity, gestational age at delivery, birth weight and previous caesarean birth.

Table 1: Distribution of caesarean births and gestational age at delivery among women with hypertensive disorders in pregnancy at KBTH

	Variable	PE n (%)	G-HPN n (%)	C-HPN n (%)	C-HPN+PE n (%)	Total n (%)
Delivery mode	Vaginal	59 (42.1)	122 (66.3)	9 (39.1)	10 (47.6)	200 (54.3)
	Caesarean	81 (57.9)	62 (33.7)	14 (60.9)	11 (52.4)	168 (45.7)
	Total	140 (38.0)	164 (50.0)	23 (6.3)	21 (5.7)	368 (100)
Types of CS	Emergency	9 (11.1)	16 (25.8)	4 (28.6)	2 (18.2)	31 (18.5)
	Non-emergency	72 (88.9)	46 (74.2)	10 (71.4)	9 (81.8)	137 (81.5)
	Total	81 (48.2)	62 (36.9)	14 (8.3)	11 (6.5)	168 (100)
GA at delivery	<34	31 (22.1)	11 (6.0)	0 (0.0)	3 (14.3)	45 (12.2)
	34-36	18 (12.9)	14 (7.6)	1 (4.3)	2 (9.5)	35 (9.5)
	37 and above	91 (65.0)	159 (86.4)	22 (95.7)	16 (76.2)	288 (78.3)
	Total	140 (38.0)	164 (50.0)	23 (6.3)	21 (5.7)	368 (100)

PE: preeclampsia, G-HPN: Gestational hypertension, C-HPN: Chronic hypertension, CHPN+PE; Preeclampsia superimposed on chronic Hypertension, CS: Caesarean section, GA: Gestational age. Emergency CS: Caesarean birth after onset of labour. Non-emergency CS: Caesarean delivery prior to onset of labour.

Table 2: Age distribution and mode of delivery among women with hypertensive disorders in pregnancy at KBTH

Age groups	Vaginal delivery n (%)	Caesarean delivery n (%)	Total n (%)	Vaginal birth rate (%)	Caesarean rate (%)
≤19	15 (7.5)	5 (3.0)	20 (5.5)	75.0	25.0
20-24	27 (13.5)	18 (10.7)	45 (12.2)	60.0	40.0
25-29	54 (27.0)	52 (31.0)	106 (28.8)	50.9	49.1
30-34	60 (30.0)	45 (26.8)	105 (28.5)	57.1	42.9
35-39	39 (19.5)	36 (21.4)	75 (20.4)	52.0	48.0
≥40	5 (2.5)	12 (7.1)	17 (4.6)	29.4	70.6
total	**200 (54.3)**	**168 (45.7)**	368 (100)	54.3	45.7

Table 3: Parity distribution and mode of delivery among women with hypertensive disorders in pregnancy at KBTH

Parity group	Vaginal delivery n (%)	Caesarean delivery n (%)	Total n (%)	Vaginal birth rate (%)	Caesarean rate (%)
0	76 (38.0)	54 (32.1)	130 (35.3)	58.5	41.5
1	39 (19.5)	39 (23.2)	78 (21.2)	50.0	50.0
2	41 (20.5)	31 (18.5)	72 (19.6)	56.9	43.1
3	22 (11.0)	26 (15.5)	48 (13.0)	45.8	54.2
4	13 (6.5)	10 (6.0)	23 (6.2)	56.5	43.5
≥5	9 (4.5)	8 (4.8)	17 (4.6)	52.9	47.1
Total	**200 (54.3)**	**168 (45.7)**	368 (100)	54.3	45.7

Table 4: Distribution of induction of labour (IOL) among women with hypertensive disorders in pregnancy at KBTH

Induction of labour	PE n (%)	G-HPN n (%)	C-HPN n (%)	C-HPN+PE n (%)	Total n (%)
Successful IOL	21 (61.8)	19 (76.0)	2 (50.0)	4 (80.0)	46 (67.6)
Failed IOL	13 (38.2)	6 (24.0)	2 (50.0)	1 (20)	22 (32.4)
Total	34 (50.0)	25 (36.8)	4 (5.9)	5 (7.4)	68 (100)

PE: preeclampsia, G-HPN: G gestational hypertension, C-HPN: Chronic hypertension, CHPN+PE; Preeclampsia superimposed on chronic Hypertension, IOL: Induction of labour

Table 5: Distribution of caesarean indications among women with various categories of hypertensive disorders in pregnancy at KBTH

Caesarean indications	PE n (%)	G-HPN n (%)	C-HPN n (%)	C-HPN + PE n (%)	Total n (%)
Abnormal presentation	4 (4.9)	9 (14.5)	2 (14.3)	1 (9.1)	16 (9.5)
Placental abruption	3 (3.7)	2 (3.2)	-	-	5 (3.0)
Failed induction	9 (11.1)	3 (4.8)	-	-	12 (7.1)
Failure to progress	6 (7.4)	9 (14.5)	1 (7.1)	2 (18.2)	18 (10.7)
Fetal distress	10 (12.4)	10 (16.1)	3 (21.4)	2 (18.2)	25 (14.9)
Unfavourable cervix	31 (19.8)	2 (3.2)	-	5 (45.4)	38 (22.6)
Previous caesarean	16 (38.3)	22 (35.5)	6 (42.9)	-	44 (26.2)
Others	2 (2.5)	5 (8.1)	2 (14.3)	1 (9.1)	10 (6.0)
Total	**81 (48.2)**	**62 (36.9)**	**14 (8.3)**	**11 (6.6)**	168 (100)

PE: preeclampsia, G-HPN: G estational hypertension, C-HPN: Chronic hypertension, CHPN+PE; Preeclampsia superimposed on chronic Hypertension

Discussion

The optimal mode of delivery in pregnant women with hypertensive disorders depends on both maternal and fetal factors. Generally, vaginal delivery is recommended unless there is an obstetric indication for CS.[1,7] In this study, 45.7% and 54.3% of the women with HDP delivered via caesarean and vaginal routes respectively. The caesarean rate determined in this study is higher than the 34% reported in Ethiopia but consistent with the rate of 45.8% determined by in Iran.[15,16] More recently, a higher caesarean rate of 90.8% among women with HDP was reported in Nigeria[17] whereas Pacher and colleagues reported 100% CS rate for women with preeclampsia[5].

In the present study, caesarean birth rate was highest (60.9%) and lowest (33.7%) in those with chronic hypertension and gestational hypertension respectively. The increased caesarean rate remained significantly high for preeclampsia and chronic hypertension, in reference to gestational hypertension, after adjusting for possible confounding factors. However, other researchers noted that caesarean rate was lowest (48.3%) in chronic hypertensive women and highest (63.8%) in severe preeclamptics.[10] A recent study that assessed maternal nearmiss and quality of obstetric care at the same institution found a caesarean rate of 29.7% in pregnant women with no major obstetric complication whereas those with potentially life-threatening condition including severe preeclampsia recorded a rate of 49.6%[18]. In Ghana, the national caesarean rate is reported as 11%[19] which is within the 5-15% recommended by the WHO[20]. The wide disparity in caesarean birth rates across countries and continents might be attributable to different socio-economic and cultural characteristics as well as the high risk nature of HDP.

It is, however, difficult to determine whether all the indications for CS in these hypertensive women were medically justifiable in the midst of the current surge of maternal request for caesarean birth in contemporary obstetrics. The main effective treatment for these disorders revolves around delivery of the fetus and placenta[1]. However, patients with severe hypertension, eclampsia and other complications need adequate peripartum stabilization and management in order to optimize obstetric outcomes. The postpartum period is a critical time for women with hypertensive disorders because of the residual possibility of complications such as eclampsia which might not be entirely eliminated by immediate delivery.

Among the women with HDP teenagers and women who were 40 years or more constituted 5.5% and 4.6% respectively. Caesarean birth rate was highest in those who were 40 years and above although they constituted the smallest proportion. The younger age group (≤19years) had the lowest CS rate with vaginal delivery rate of 75%. This is an interesting finding regarding their future reproductive performance especially in a developing country like Ghana with a high total fertility rate of 4.3, low modern contraceptive prevalent rate of 24% and high adolescent birth rate of 60 per 1000 births[18]. The above finding is encouraging because high CS among our teenagers has serious obstetric sequelae on their future reproductive outcome.

Among the hypertensive women who had vaginal delivery 7.0% had vacuum extraction and this was necessary to shorten the second stage of labour for both maternal and fetal benefits. Regarding those who had CS, 18.5% were in labour whiles 81.5% had not gone into labour. A recent study at KBTH determined that 50.5% of women underwent CS before the onset of labour compared to the 81.5% determined in the present study[21]. This variation might be partly attributable to the fact that the current study recruited high risk hypertensive women most of whom needed urgent delivery prior to the onset of labour to help control their blood pressures and avert the associated complications.

The current study also determined the rate of induction of labour (IOL) among the hypertensive mothers as 18.5% with a composite success rate of achieving vaginal delivery of 67.6%. This finding is consistent with that of Ben-Haroush and colleagues who reported successful IOL in approximately 75% of patients with hypertensive disorders and unfavourable cervix, without serious maternal or fetal complications[6]. However, the rate of IOL determined in this study was lower compared to the rate of 36% reported by Wolde et al in Ethiopia[15]. In our study, the tendency of being induced was highest in preeclampsia and preeclampsia superimposed on chronic hypertension groups but lowest in the women with gestational hypertension. The successful IOL rate, defined as achieving vaginal delivery as the endpoint, was highest in preeclampsia superimposed on chronic hypertension and lowest in uncomplicated chronic hypertension.

Trial of induction of labour is generally recommended regardless of cervical assessment findings in severe preclampsia[12]. However, caesarean delivery should be considered if vaginal delivery cannot be achieved within a reasonable time frame[1]. This study has shown that IOL is a frequent obstetric intervention which averted the need for caesarean birth in a significant proportion of women with HDP at KBTH. Similarly, induction of labour after 37 weeks of gestation has been shown to be associated with improved maternal outcome with no cases of neonatal or maternal deaths or eclampsia among women with mild hypertensive disease[22]. Also, immediate delivery has been hypothesized to reduce the risk of adverse maternal outcomes in mild hypertensive disorders between 34-37 weeks of gestation but increases the risk of neonatal respiratory distress syndrome significantly[23], and therefore expectant management is recommended until the clinical or biochemical parameters of the mother or fetus begin to deteriorate[23,24].

In the present study, the common indications for CS determined among these cohorts of patients with HDP were previous caesarean birth (26.2%), unfavourable cervix (22.6%), fetal distress (14.9%), failure to progress (10.7%), abnormal presentation (9.5%), failed induction of labour (7.1%) and placental abruption (3.0%). In a study by Yucesoy and colleagues, a higher CS rate of 58.8% was reported with fetal distress being the most frequent indication (46%) followed previous caesarean section.[10] In the current study previous CS was the most common caesarean indication and this could be partly due to high rate of primary caesarean birth in these women with HDP. Women with chronic hypertension and gestational hypertension had the highest and lowest frequencies of prior CS as an indication for a repeat abdominal delivery respectively.

Intriguingly, none of the patients with preeclampsia superimposed on chronic hypertension had prior CS as an indication for repeat caesarean delivery compared to those with uncomplicated chronic hypertension. It is important to recognize that among the study population, 17.7% had a background history of previous CS and that might partly explain the high caesarean rate among this population. To buttress this point, Obed and Aniteye studied the reproductive performance of women with prior history of eclampsia and noted that as high 54.2% had had CS in their previous pregnancies[25]. Generally, it is very important that the indication for primary CS be carefully reviewed in all cases to adequately ascertain the genuineness of the need for abdominal delivery to obviate serious obstetric consequences in future maternities. In the current study, 34.5% of the eclamptics achieved vaginal delivery whiles 65.5% had caesarean birth. Eclampsia is generally considered as variant of severe preeclampsia and in such conditions vaginal delivery is still the preferred mode of childbirth especially when maternal and fetal parameters are stable[1].

Unfavourable cervix was the second most common indication for CS among these women with HDP. It possible that most of the caesarean deliveries due to unfavourable cervix could have been delivered vaginally via careful peripartum stabilization with a targeted blood pressure control followed by IOL and augmentation of labour. Fascinatingly, none of the patients with chronic hypertension had unfavourable cervix as an indication for CS in this study.

Failure to progress including cephalopelvic disproportion also constituted a significant indication for CS among the hypertensive mothers with the highest frequency occurring in the preeclampsia superimposed on chronic hypertension subgroup. In the current study, fetal malpresentation accounted for 9.5% of the caesarean births and this finding is consistent with the rate of 9.3% reported in Iran[10]. Also, placental abruption constituted 8% of caesarean indications in the Iranian study[10] compared to the 3% in our study. The possible reasons for the wide variation regarding placental abruption as caesarean indication might be varied. These include the differential favorability of the cervix for IOL in the midst of torrential antepartum hemorrhage with or without coagulopathy as well as the availability of blood products for transfusion. In situations of torrential antepartum hemorrhage immediate abdominal delivery is recommended unless the parturient is in second stage of labour when instrumental delivery is readily achievable. In this study there were 16 cases of placental abruption out of which 68.75% successfully achieved vaginal delivery with 31.25% delivering via CS. Vaginal delivery is generally preferred to CS in placental abruption because of the increased possibility of coagulopathy which might culminate in difficulty in securing hemostasis at surgery.

The limitations of the study include the short duration of the study with associated small numbers and lack of controls. Also, the study was conducted in a tertiary hospital setting where complicated cases of HDP are referred for specialist management and this might have distorted the numerator and denominator factors in

the equation. However, the findings of this study would serve as evidence for clinicians and policy makers in devising more appropriate guidelines for managing HDP. These findings will also stimulate a larger clinical study to better relate and determine the true population estimates regarding the mode of delivery and caesarean indications in women with HDP.

Conclusion

The current study has determined that 45.7% and 54.3% of the women with HDP at KBTH achieved caesarean and vaginal births respectively. Caesarean birth rate was highest (60.9%) and lowest (33.7%) in chronic hypertension and gestational hypertension respectively. Induction of labour was found to be a frequent obstetric intervention which obviated the need for caesarean section in a significant number of women with HDP. The common caesarean indications among women with HDP determined in this study were previous caesarean birth, unfavourable cervix, fetal distress, failure to progress, fetal malpresentation, failed induction of labour and placental abruption.

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Competing Interests

The authors declare that they have no competing interests.

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THE GEOGRAPHICAL DISTRIBUTION OF GASTROINTESTINAL ENDOSCOPY SERVICES WITHIN GOVERNMENT AND FAITH BASED HOSPITALS IN GHANA

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Abstract

Background: Gastrointestinal (GI) endoscopy is generally a very safe and effective diagnostic and interventional modality in the current practice of medicine. To plan a comprehensive equitable gastrointestinal endoscopy service, the geographical distribution of this essential facility needs to be mapped.
Methods: This study was a cross sectional situational survey of gastrointestinal endoscopy services within government and faith based health facilities in Ghana. Information on the availability of GI endoscopy services as at December 2016 was obtained by interviewing doctors from the various regions in Ghana. Five (5) doctors working in different hospitals were interviewed per region.

***Results*:** Gastrointestinal (GI) endoscopy service was available in 3 out of the 4 teaching hospitals and only one regional hospital (Sunyani) in Ghana. The upper east, Upper west and Volta regions have no GI endoscopy services within any government or faith based facility. The Christian Health Association of Ghana (CHAG) complemented government effort with GI endoscopy units at 4 district hospitals located in the Eastern, Central, Brong Ahafo and Volta regions.
Conclusion: The distribution of gastrointestinal endoscopy services within government and faith based facilities is uneven. There is an urgent need to establish these services equitably across Ghana.

Key Words: Gastrointestinal endoscopy, government, faith based and Ghana.

Introduction

Gastrointestinal endoscopy is the video system aiding visualization of the lumina of the gastrointestinal tract (oesophagus, stomach, duodenum, jejunum, ileum and colon). It is generally a very safe and effective diagnostic and interventional modality in the current practice of medicine. The indications for GI endoscopy are varied and may be for diagnostic, therapeutic or surveillance purposes. It contributes significantly to a good outcome in many gastrointestinal (GI) diseases and is the backbone for national colorectal cancer screening programmes[1,2].

Gastroenterology is one of the fast-growing specialties world wide with advancing technology for diagnostics and therapeutics. In Ghana gastrointestinal endoscopy started in the late 1970's and was later revived by a Japanese initiative (Japan International Cooperation Agency).

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Through this initiative clinicians were sponsored for training in gastrointestinal endoscopy outside Ghana. These medical doctors returned to improve endoscopic diagnosis and care for clients with gastrointestinal diseases. Practitioners in Ghana have benefited from the experience of renowned trainers across the globe in both diagnostic and therapeutic endoscopy[3].

Currently there is a formal training programme for gastroenterologist in Ghana under the Ghana College of Physicians and Surgeons and the West African College of Physicians. This training is aimed at bridging the gap for practitioners in the care for gastrointestinal diseases.

Ghana is bounded by Burkina Faso on the north, Togo on the east, Côte d'ivoire on the west and the Gulf of Guinea on the south [figure1]. It has a surface area of 238,540 km^2,10 administrative regions, a gross domestic product of 37.54 billion US Dollars and a GDP per capita of 1696.64 US dollars in 2016[4,5]. Despite the importance of GI endoscopy to healthcare in Ghana, the distribution of this service within government and faith based facilities across the country is not known. To plan a comprehensive equitable gastrointestinal endoscopy services within Ghana, the geographical distribution of this essential facility needs to be mapped.

Methods

This was a cross sectional situational survey of gastrointestinal endoscopy services within government and faith-based health facilities in Ghana. Data was obtained by interviewing doctors at the various regions in Ghana. Five (5) doctors working in different hospitals were interviewed per region. The availability of GI endoscopy services within these facilities as at December 2016 was mapped.

Limitation

Data was obtained by interviewing doctors working in the various regions, as there is no designated outfit responsible for registering gastrointestinal endoscopy units in Ghana. The study did not include GI endoscopy facilities in private practice.

Results

Only one regional hospital (Sunyani) in Ghana offers GI endoscopy service three out of the four teaching hospitals offer GI endoscopy services. The Upper East, Upper West and Volta regions have no GI endoscopy services within any government or faith-based facility. Results displayed in Figure1 and Tables 1 & 2.

Fig 1. Map of Ghana showing the 10 regions

Table 1. Regional distribution of gastrointestinal endoscopy services within government facilities in Ghana.

Region	Availability of GI Endoscopy service	Name(s) of facility	Availability of gastroenterologist/Trained endoscopist	Interventions available
Eastern	None	NA	None	NA
Volta	None	NA	None	NA
Greater Accra	Yes	1. KorleBu Teaching Hospital 2. 37 Military Hospital	Yes	Yes
Central	None	NA	Yes	NA
Western	None	NA	None	NA
Brong Ahafo	Yes	Sunyani regional hospital	Yes (Visiting surgeon)	None
Ashanti	Yes	Komfo Anokye Teaching Hospital	Yes	Yes
Upper east	None	NA	None	NA
Upper West	None	NA	None	NA
Northern	Yes	Tamale Teaching Hospital	Yes	Yes

NA- Not applicable

Table 2. Distribution of gastrointestinal endoscopy services within faith based facilities in Ghana.

Region	Availability of GI Endoscopy service	Name(s) of facility	Availability of gastroenterologist/Trained endoscopist	Interventions available
Eastern	YES	St. Dominic's Hospital, Akwatia	YES	YES
Volta	YES	Battor Catholic hospital	YES	NONE
Greater Accra	NONE	NA	NONE	NA
Central	YES	St. Francis Xavier Hospital, Assin Foso	Yes	YES
Western	NONE	NA	NONE	NA
Brong Ahafo	YES	Holy Family Hospital,	YES	None
Ashanti	NONE	NA	NONE	NA
Upper east	None	NA	None	NA
Upper West	None	NA	None	NA
Northern	NONE	NA	NONE	NA

NA-Not applicable

Discussion

Our study highlighted the uneven distribution of GI endoscopy services within government and faith based facilities in Ghana. For the teaching hospitals across Ghana only the Cape Coast Teaching Hospital (CCTH) does not have GI endoscopy services although they have trained personnel with skills for both diagnostic and therapeutic endoscopy. CCTH serves as the referral hospital for the people of Western and Central regions therefore the absence of this facility will likely result in poor outcome of patients requiring emergency GI endoscopy. Of the 10 regional hospitals only Sunyani hospital offers a GI endoscopy service. Though regional hospitals are supposed to receive referrals from the district and sub-district areas, most of them lack GI endoscopy services for managing emergency cases such as gastrointestinal bleeding.

The Christian Health Association of Ghana (CHAG) has set up many healthcare facilities across the country, which are complimentary to that of government. In our study it was realized that CHAG facilities have made available GI endoscopy services at four district hospitals in four regions namely Eastern, Central, Brong Ahafo and Volta. CHAG facilities provide services in nearly 50% of the regions not covered by government in terms of GI endoscopy access.

Patients from the six regions (Eastern, Western, Volta, Upper east, Upper west and Central) without GI endoscopy in any government facilities may get referred

elsewhere with attendant delays and difficulties with transportation.

Managing gastrointestinal diseases especially acute bleeding without GI endoscopy remains a challenge. We are unable to make use of current technology in the field of GI interventions to improve outcome at our facilities mainly because of unavailability and qualified professionals[6,7] There is associated high mortality in acute gastrointestinal bleed[8,9] because of inadequate and skewed distribution of GI endoscopy services. Provision of GI endoscopy facilities should be done in all the gap areas identified. For the areas without trained personnel a special competency based training using the Walker and Peyton's approach can be done so such individuals can be credentialed to perform the endoscopic procedure with safety in mind[10]. Our study focused on government and faith based facilities as they contribute significantly to healthcare in Ghana especially in the rural setting. These institutions were targeted as it will be easy to effect changes in these institutions positively.

Conclusion

The distribution of gastrointestinal endoscopy services within government and faith based facilities is uneven in Ghana. There is an urgent need to establish these services equitably across the country.

Declaration of Originality

We declare that this is our own original work

Competing Interest

Authors declare no competing interest.

Authors Contribution

AYA design, data collection, write up and review of manuscript, NAA, RK, ODD, SBD contributed to data collection and write up of this manuscript.

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PATTERN OF CONGENITAL CENTRAL NERVOUS SYSTEM ANOMALIES AMONG NEWBORNS AT A REGIONAL SPECIAL CARE BABY UNIT (SCBU) IN MAKURDI, NORTH CENTRAL NIGERIA

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Abstract

Background: Congenital anomalies of the central nervous system (CNS) are important causes of childhood mortality, chronic illness and disability. They have significant implications for childhood growth and development particularly in resource limited settings. A review of their occurrence is valuable to instituting preventive and curative health care services.

Objective: To document the pattern of congenital CNS anomalies in our practice

Subjects and Method: A retrospective study of all neonatal admissions with congenital anomalies of the CNS (Patients) admitted into the Special Care Baby Unit (SCBU) of Benue State University Teaching Hospital (BSUTH) in Makurdi-Nigeria, between June 2013 and January 2016. The anomalies were classified according to the ICD 10 Classification. Other parameters assessed were: age at admission, gestational age at delivery, family history of congenital anomalies, maternal age, social class, history of ante natal care, and admission outcome.

Results: A total of 73 (9.3%) out of the admitted 785 neonates had congenital anomalies and majority (28, 38.4%) were of the CNS. The affected patients had a male preponderance (20, 71.4%). Myelomeningocele was the commonest CNS anomaly (20, 71.4 %). Poor antenatal care, lack of periconceptional folic acid (pFA) intake, late folic acid supplementation, low socio economic class, and late presentation were all associated with the incidence of congenital CNS anomalies. The patients had a neonatal mortality rate of 7.1% over the study period of 30 months (2.8% per year).

Conclusion: Congenital CNS anomalies were the predominant congenital anomalies, and myelomeningocele was the commonest. The study underscores the need to institute a comprehensive healthcare programme for the prevention and management of congenital anomalies of the CNS in our practice.

Key Words: Congenital anomalies, Central Nervous System, Newborn, Nigeria, Myelomeningocele

Introduction

Congenital anomalies are important causes of childhood death, chronic illness and disability.[1] These are structural and functional anomalies that occur during intra uterine life and can be identified pre natally, at birth, or later in life.[1] It has been estimated that over a quarter of a million deaths occur annually from congenital anomalies and 94% of severe congenital anomalies occur in low and middle income countries (LMICs)[1]. Congenital Central Nervous System (CNS) anomalies constitute a significant proportion of these anomalies and affect 1 to 10:1,000 live newborns[2-7]. In Nigeria, an incidence rate of 7/1000 live newborns have been reported[8].

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These anomalies include those of neural tube formation (Neural Tube Defects), regionalisation (holoprosencephaly), cortical development (microcephaly), posterior fossa structures (aplasia or hypoplasia of the cerebellar hemispheres, Dandy-Walker malformation), and combined (agenesis of the corpus callosum)[9]. Several studies indicate that Neural Tube Defects (NTDs) constitute a majority of these anomalies[2-9]. Recognised risk factors for the development of these congenital anomalies include: maternal diabetes, obesity, maternal hyperthermia, exposure to teratogens, and low socioeconomic status[1,2]. Several of these factors are prevalent in LMICs[1,2].

Children with congenital CNS anomalies are children with special health care needs. These children are prone to higher mortality, chronic disability, impaired health-related quality of life, and lifelong dependence on economic and psychosocially burdened caregiver(s)[10]. The challenges brought about by these outcomes are even more pronounced and profound in resource limited settings such as the LMICs[10].

In the developed countries, the incidence of some of these anomalies such as the NTDs has fallen over recent decades[1,2]. Institution of preventive strategies such as

the intake of periconceptional folic acid (pFA) has decreased the prevalence of NTDs by 50-70%[2,11]. The prevention and management of CNS congenital anomalies in several LMICs is quite underdeveloped[12].

There is limited information on the epidemiological and clinical characteristics of these anomalies in our environment. This could adversely affect the incidence, quality of care, and outcomes associated with these anomalies. The aim of this study was to further document the characteristics of congenital CNS anomalies in our environment with a view to instituting effective preventive strategies against the incidence and consequences of these anomalies.

Subjects and Methods

This is a retrospective study of the records of all neonatal admissions with a diagnosis of congenital anomalies of the CNS, in the Special Care Baby Unit (SCBU) of the Benue State University Teaching Hospital (BSUTH) in Nigeria, between January 2013 and January 2016. The hospital is a tertiary health facility that provides newborn health services to Benue state and the other five states that make up North Central Nigeria. The state has a population of 4.2 million persons and majority of the inhabitants are farmers.[13]

The SCBU of BSUTH has facilities for newborn resuscitation, incubator care, exchange blood transfusion, phototherapy and other essential newborn care services. It has a16 bed capacity for both in-borns and out-borns. The staff of the SCBU include: 2 supervisory consultant paediatricians, 3 paediatric residents in training, 2 house officers, and 12 nurses. International Classification of Diseases and Related Health Problems 10th Revision (ICD 10) Classification was used in classification of the disorders.[14] Social class classification (Classes I to V) was done according to that by Ogunlesi et al.[15] The social classes were further stratified into the upper (Classes I to III) and lower (Classes IV and V) classes based on similarity in social characteristics. A structured questionnaire was used in extracting information from the case notes. Parameters assessed included: Age at admission, gestational age at delivery, type of congenital anomaly, family history of congenital anomalies, maternal age, social class, history of ante natal care (ANC), and outcome of admission.

Ethical approval was obtained from the Human Research Ethics Committee of BSUTH.

Data was analyzed using Epi Info 3.5.3 and reported as proportions using frequencies and percentages. Chi-square test was used in determining the degree of significance in relationship between the obtained proportions and Yates correction where applicable. A p-value of less than 0.05 was regarded as significant.

Results

A total of 785 neonates were admitted into the SCBU over the study period and 73 (9.3%) of them had congenital anomalies. Out of those with congenital anomalies, 28(38.4%) of them had congenital CNS anomalies and their case notes were all reviewed. Congenital CNS anomalies, representing 3.6% of the total hospital neonatal admissions, were the commonest congenital anomalies among the neonates (Table I).

There were multiple congenital anomalies in nine (12.3%) out of the 73 neonates with congenital anomalies: Four patients had multi-system congenital anomalies involving the CNS and the Musculo-skeletal system; Two patients had congenital anomalies involving both the Digestive and Urogenital systems while the remaining three had multiple congenital CNS anomalies.

Myelomeningocele was the commonest (20, 71.4%) congenital CNS anomaly (Table II). Out of the patients with myelomeningocele, three (15%) and four (20%) had congenital hydrocephalus and talipes equinovarus respectively.

There was a male preponderance (20, 71.4%; Male: Female ratio 2.5:1) among the 28 patients. The age range at presentation, in days, was 1 to 21 days (Mean: 4.7±5.0 days; Median: 2.5 days). Majority (19, 67.9%) of the patients presented after 24 hrs of delivery and two (7.1%) of them were inborn. Three (10.7%) of the patients had a positive family history of congenital anomalies (two cases of umbilical hernia and one case of polydactyl). Only two (7.1%), who had their antennal care in BSUTH, had a prenatal diagnosis.

The age range of the mothers was 19 to 36 years (Mean 26.9 ±5.3 years), and most (22, 78.6%) were of the lower socio economic classes (Table III). The commonest place for ANC visits by the subjects' mothers was a Primary Health Care centre (8, 28.6%), and 13 (46.4%) of them did not receive ANC services (Table III). None of the mothers received pre conception folic acid supplementation, while 15 (53.6%) of the mothers who eventually had folic acid started after 3 months of gestation.

Half (14, 50%) the number of patients was discharged home to continue therapy from there while seven (25%) were discharged home against medical advice (Table IV). The mortality rate among the patients was 7.1% over the study period (2.8% per year). The mortality rate among the patients was significantly (p=0.009) lower than in the neonates with congenital anomalies of the other body systems (Table V). The rates per body system for discharges, discharge against medical advice and referrals out were higher, though not significantly, in the patients than in the other body systems' congenital anomalies (Table V).

Table I. Distribution of congenital anomalies by body system in the admitted 785 neonates

Body system	Number of neonates with congenital anomalies (n=73)	Percent of total
Central Nervous System	28	38.4
Digestive System	25	34.3
Musculo Skeletal System	18	24.7
Urogenital System	9	12.3
Cardiovascular System	4	5.5

Table II. Types of congenital CNS anomalies

Congenital anomalies	Number of Neonates (N=28)	Percent of total (95% Confidence Interval)
Myelomeningocele	20	71.4 (0.539-0.890)
Congenital hydrocephalus	6	21.4 (0.055-0.374)
Spina Bifida **Occulta**	2	7.1 (0.000-0.171)
Meningocele	2	7.1 (0.000-0.171)
Encephalocele	2	7.1 (0.000-0.171)
Microcephaly	1	3.6 (0.000-0.108)

Table III. Socio demographic characteristics of the 28 patients' mothers and their place of Ante Natal Care

Variable	Patients' mothers (n=28)	Percent of total
Age group (years)		
≤19	3	10.7
20-29	17	60.7
30-39	8	28.6
Social class		
Upper (I-III)	2	7.1
Lower (IV-V)	26	92.9
Place of ANC		
Primary Health Care Centre	8	28.6
Maternity Home/Clinic	3	10.7
General/Teaching Hospital	4	14.3
None	13	46.4

Table IV: Distribution of management outcome among the 28 patients

Management outcome	Number of neonates	Percent of total
Discharged home	14	50
DAMA	7	25
Referred out	5	17.9
Died	2	7.1
Total	28	100

DAMA= Discharged Against Medical Advice

Table V: Admission outcome variables in the 28 patients and others with congenital anomalies

Admission outcome	Patients	Others	P Value
	N=28(**100%**)	N=45(**100%**)	
Discharged home			
Yes	14(50)	16(35.6)	0.223
No	14(50)	29(64.4)	
DAMA			
Yes	7(25)	6(13.3)	0.205
No	21(75)	39(86.7)	
Referred out			
Yes	5(17.9)	6(13.3)	0.850*
No	23(82.1)	39(86.7)	
Died			
Yes	2(7.1)	17(37.8)	0.009*
No	26(92.9)	28(62.2)	

DAMA= Discharged Against Medical Advice, * With Yates correction

Discussion

Congenital anomalies of the CNS were the commonest congenital anomalies (38.4%) among neonates in this study with myelomeningocele ranking highest. A majority of the affected patients presented late. Furthermore, most mothers of the affected patients had no pre conception folic acid, had poor ante natal care, and were from the lower socio economic classes. The CNS anomalies had the lowest mortality rate when compared to other congenital anomalies.

The prominence of congenital CNS anomalies among other neonatal congenital anomalies has been reported from other studies conducted in Nigeria. Studies by Singh et al[16] from north-west Nigeria (44%), Obu et al (64.7%)[17] and Eke et al (68.1%)[18] from the eastern region of Nigeria all reported a predominance of congenital CNS anomalies among congenital anomalies in newborns. Reports from other parts of Africa[19], and the world [2, 20] also report a significant prevalence of CNS anomalies among neonates with congenital anomalies. The prevalence of CNS anomalies in these studies could be have been influenced by the fact that the relevant tertiary health services are rendered in the centres were the studies were conducted. Furthermore, the mothers in these studies also share similar socio demographic characteristics such as poor ante natal history and poor pFA supplementation. However, reports by Ambe et al [21] indicated a higher prevalence of anomalies of the digestive system over that of the CNS. The difference could be explained by the differences in the presence and expression of potential environmental, nutritional and genetic factors in the different populations studied. It is pertinent to note that in the study by Ambe et al, the prevalence of the CNS anomalies was second in ranking.

Myelomeningocele was the commonest congenital CNS anomaly identified in this study. This outcome is similar to that from studies within Nigeria,[16-18,22] and Africa[19] in general. The quite visible nature of myelomeningocele could facilitate its presentation for treatment. Furthermore, other conditions such as anencephaly and encephaloceles are associated with a higher fetal mortality rate.[23]. The specific role of identifiable risk factors in the mothers (lack of pre conception folic acid intake[11] and low socio economic status[24]) in the high prevalence of myelomeningocele over other congenital CNS anomalies was not ascertained in this study**.** Myelomeningocele has also been reportedly associated, at variable incidence rates, with hydrocephalus and talipes equinovarus.[25]In this study, 14.3% and 9.5% of the patients had the co morbidities of hydrocephalus and talipes equinovarus respectively. This is comparable to findings reported by Warf.[25] The causal relationship between these congenital anomalies is still a subject of continuous scientific research and beyond the scope of this study. However, these findings underscore the need to actively examine for other anomalies when one CNS anomaly is identified.

There was a poor history of ANC attendance among the mothers in this study. Poor attendance at ANC centres were associated with occurrence of congenital CNS anomalies in reports from Ambe et al[21] and Costa et al[26]. Inability to access ANC has been linked to being in the low socio economic class, limited knowledge of its benefits, lack of financial capacity to access the service, and utilisation of traditional medication during pregnancy.[27]The fact that majority of the mothers in this study were of the low socio economic class could have contributed to the low ANC visits. The receipt of ANC

by mothers promotes good health outcomes, for both the mother and unborn child.[28] The ANC practices such as the routine obstetric nutritional supplementation, health education, the early detection and prompt treatment of diseases, can reduce exposure to risk factors and consequently reduce the incidence of these congenital anomalies in pregnancy.[28]

The average period of ANC commencement, in those who had ANC, in this study was three months. At this stage any obstetric micro nutrient supplementation would be ineffective against the development of the main congenital CNS anomalies[11]. Late commencement of ANC has also been associated with the incidence of congenital CNS anomalies.[17] Additionally, none of the mothers in this study had pre conception folic acid supplementation. Preconception and periconceptional folic acid intake is reportedly poor in several LMICs[29]. Lawal and Adeleye reported poor intake of folic acid at preconception and early pregnancy among Nigerian mothers in south west Nigeria.[29] The poor intake was significant among working class mothers, those with limited education, and late attendees at ANC centres.[29] Poor folic acid supplementation could have contributed significantly to the prevalence of NTDs in this study. Globally, studies have shown that lack of pFA supplementation was significantly associated with occurrence of NTDs.[2, 11]

Majority of the mothers in the study were of the lower socio economic classes. Being in the low socio economic class has been associated with development of congenital anomalies.[24] Low-income may be an indirect determinant of congenital anomalies with 94% of severe congenital anomalies occurring in low- and middle-income countries.[1] Characteristics of these classes such as: poor income; poor nutrition; limited access to ante natal care services; low educational level and hazardous living conditions, could be significant contributory factors.[1] While some of these factors could play out in the upper socio economic classes, where they do not occur in the upper social classes, genetic susceptibility could play a more prominent role.

Advanced maternal age has been has been associated with chromosomal abnormalities, and other serious complications of pregnancy.[30] However the role of maternal age as a risk factor in the development of congenital anomalies has been in conflict.[30] Goetzinger et al recently reported that advanced maternal age is associated with an overall decreased risk for major congenital anomalies in the absence of aneuploidy.[30] However, in an earlier study, Hollier et al reported otherwise.[31] The average age of the mothers in this study was less than 35 years old. The high incidence of congenital CNS anomalies among young mothers has a severe implication in our setting and the entire sub Saharan region. This is because childbearing, in the region, is commoner in the younger populations of women.[32] Consequently, the focus of preventive strategies against development of these anomalies needs to be emphasised among young girls and women of reproductive age in the region.

There was a male preponderance among the patients. The male sex preponderance has also been reported from other similar studies from Nigeria and other regions of the world. [2, 16,17,18] The finding in this study could reflect the genetic etiology of the recorded disorders. However, hydrocephalus which could be X-linked, was only observed in three (15%) of the males. Male predilection could also suggest a sex –biased health seeking behavior of the parents. Using data from 17 sub Saharan African countries that reviewed parental health seeking behavior for sick children, it was observed that girls are disadvantaged for curative behaviors.[33] A gender bias against the girl child while seeking for health remedies for sick children has also been reported worldwide[34]. Furthermore, congenital anomalies in the females could have been more lethal and thus associated with early fetal mortality.

There is a higher recurrence risk in siblings of affected children and a higher incidence of NTDs in consanguineous marriages compared to controls.[2] In this study, 10.7% of the patients had a positive family history of congenital anomalies even though those anomalies involved other systems. The incidence of congenital anomalies in specific populations, irrespective of how benign they might seem, should provoke scientific enquiry in such populations. This could lead to identification of susceptible genes and development of modalities for reducing their expression.

The possibility of the contribution of other unidentified risk factors, to the prevalence of the congenital CNS anomalies, in this study cannot be overemphasized. Maize is one of the staple foods of the studied population. The ingestion of fumonisin in contaminated maize has been identified in the etiology of NTDs.[2] Also, exposure to pesticides, which are commonly used in farming populations such as the studied population, could also have been contributory.

In this study, the diagnosis and management of the patients were fraught with challenges. Only two (7.1%) had prenatal diagnosis. Limited specialist diagnostic services in our health system and the cost of accessing them could have been contributory. The poor ante natal care could also have been responsible for the poor prenatal diagnosis observed in this study. Absence of a prenatal diagnosis obviates therapeutic intervention before birth. Interventions such as intra uterine surgery have been reported to improve outcomes, reduce economic and psycho social burdens for congenital anomalies.[2] Late presentation for therapy constitutes another challenge in the management of these conditions, and has been associated with increased mortality.[35] The average age at presentation, for the patients, was 4.5 days after birth. Other studies from Nigeria and the sub Saharan Africa region have also

reported late presentation for treatment in patients with congenital CNS anomalies.[35] Contending with grief, lack of information as to what to do next, financial constraints are some of the reasons that have been adduced for late presentation.[35]

Abrupt cessation of management manifesting as request for DAMA is another management challenge. A sizable proportion of parents in this study asked for DAMA. This has also been reported in other similar studies from Nigeria.[36] Reasons that have been adduced for DAMA include: lack of conviction about the quality of care received, doubts about positive health outcomes, economic burden associated with sponsoring care, the desire to seek traditional health options, conviction about the etiology of the disease.[36] This type of discharge could promote poorer outcomes with the congenital CNS anomalies.

The management of these anomalies requires specialist services that are scarce in settings such as ours.[35] Receipt of specialist management services is associated with better health outcomes. In our study, the mortality rate in the subjects was significantly lower when compared with that associated with other congenital anomalies. The presence of specialists such as a paediatric surgeon and neurosurgeon in the management team, and the absence of such relevant specialists for the other anomalies, could have been contributory. Funding the management and provision of services for these anomalies is challenging. It has been estimated that the lifetime direct and indirect costs for severe Spina bifida are more than $250,000.[2] This is quite burdensome in the LMICs. High costs such as this could significantly affect the availability, accessibility, and utilisation of the relevant health care services.

In order to obviate the highlighted challenges it is important to adopt a comprehensive approach that is initiated and driven by the government. This because of the enormous cost associated with the provision of care for these anomalies. The first step in the approach is to assess the magnitude of the problem. This can be achieved through the conduct of a national survey on the prevalence of these anomalies. This will facilitate the right policy formulation towards addressing the anomalies, and the appropriate deployment of resources. Secondly, the government should increase spending in the health sector particularly in the areas of providing specialist centres and services. It should also invest in care capacity development through training of specialists in the relevant specialties. Thirdly, there should be institution of social service programmes that are supportive of the patients and their care givers. Corporate organisations should also be encouraged to participate actively, as part of their corporate social responsibility to the community, in the provision of relevant care services and facilities. Fourthly, massive enlightenment programs should also be instituted by the government. These programs should focus on the avoidance of the established risk factors within the country, and the promotion of healthy living habits.

Conclusion

Congenital CNS anomalies were an important cause of neonatal morbidity and mortality in this study. Poor ANC, lack of pre conception folic acid intake, late folic acid supplementation, and low socio economic class were all associated with the incidence of congenital CNS anomalies. A significantly low mortality rate, compared to that observed with congenital anomalies of other systems, was observed in the subjects. These findings underscore the need to promote and sustain preventive strategies against development of congenital CNS anomalies particularly in the country. As elucidated by the World Health Organisation, these strategies should include: promoting adequate nutrition among women of reproductive age, routine folic acid supplementation in girls and mandatory pFA institution at the earliest indication of pregnancy, avoidance of harmful substances such as tobacco and alcohol in pregnancy, limiting environmental exposure to hazardous substances, and promotion of ANC services.[1] Early detection of the congenital anomalies should also be promoted. This can be done through conducting maternal serum alpha-fetoprotein (MSAFP) test in pregnancy and neonatal screening.[1]

Globally, countries should be encouraged to implement the resolutions of the World Health Assembly on congenital anomalies.[1] These resolutions include: Developing and strengthening registration and surveillance systems; Developing expertise and building capacity; Strengthening research and studies on etiology, diagnosis and prevention; Promoting international collaborative efforts.[1] The establishment of national and regional referral centres, while strengthening the existing referral systems, for provision of specialised care to those affected will facilitate achievement of some of these resolutions. Also, instituting and fostering accessible social, economic, and educational support programmes will engender identification and compliance with effective management of these anomalies.

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THE PATTERN OF HIP FRACTURES OVER A TEN-YEAR PERIOD IN A MAJOR REFERRAL CENTRE IN GHANA

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Abstract

Background: The incidence of hip fractures is projected to increase worldwide and so are the associated morbidity, mortality, and cost of managing patients with hip fractures. There is, however, scarcity of data on trend and incidence of hip fractures in sub-Saharan Africa making planning and management difficult.
Methods: This is a retrospective study that involves all hip fractures seen and admitted to Korle-Bu Teaching Hospital in Accra, Ghana from 2007 to 2016. The demographic characteristic (sex and age), mechanism of injury, and the fracture type were documented. Association between age, sex, and mechanism of injury and type of fracture were determined by Chi-square, with p-value< 0.05 as the level of significance.
Results: Nine hundred and twenty-nine patients were admitted over the 10-year period. There were 492 (53%) females and 437 (47%) males, a ratio of 1.1:1.0.
The mean age was 72.2 ± 14.4 years. Falls which mostly were low energy constituted 726 (78.1%) of cases with 203 (21.9%) resulting from road traffic accidents (RTA). There was an increase in patients with hip fractures from 2007 to 2012 followed by a gradual decline. Approximately 490 (52.7%) and 439 (47.3%) of the cases were extracapsular and intracapsular respectively. There was strong association between age and mechanism of injury (X^2 (2) =492.10, $p < 0.001$, Φ =0.73) and moderate association between sex and mechanism of injury (X^2 (1) =37.50, $p < 0.00$, Φ =0.21). There was no significant association between sex or age and the type of fracture ($p>0.05$)
Conclusions: This study shows a 10-year trend of hip fractures in a major referral hospital in Ghana. It will serve as a baseline information for a nationwide study on the incidence rate of hip fracture in the country. It also has a great implication for future planning and management.

Key Words: Hip fracture, Ghana, trend, type of fracture, mechanism of injury

INTRODUCTION

Hip fracture is a break in the continuity of the proximal portion of the femur which may be associated with soft tissue injuries around the hip. The incidence of hip fractures, as well as the treatment outcomes in Ghana, are not known as these have not been documented or published, though there are many centers in the country that manage these injuries on a daily basis.

However, the incidence of hip fractures worldwide is expected to exceed 6 million cases by 2050[1]. Data from the United States Agency for Healthcare Research and Quantity (AHRQ) indicated that a total of 310,000 persons were admitted in 2003 in the United States for hip fractures and that alone accounted for 30% of hospital admissions[2]. Approximately 10 to 15 billion dollars is spent annually treating these injuries[3-6].

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A study by Brauer et al[7] examined the trend and accompanying mortality following hip fractures over a 20 year period. They found a steady decline in the incidence rate between 1995 and 2005 after an initial rise in 1986 to 1995. They postulated that the increased awareness of bisphosphonates, calcium, and vitamin D supplementation among other reasons accounted for the decline. In most Asian countries, the incidence of hip fractures has doubled or tripled over the last 30 years. A result of an aging population with osteoporosis, which by 2050, may be the cause of over 50% of these fractures[8, 9].

There is a limited number of studies on the incidence and pattern of hip fractures from Africa[(10)]. Studies by Zebaze et al (57.1 per 100,000/year in females and 43.7 per 100,000/year in males over 35 years) in Cameroon and El Maghraoui et al (80 per 100,000/year for females and 50 per 100,000/year for men in Rabat, Morocco) from Morocco reported low rates of hip fractures. Dhanwal et al concluded that it was quite difficult to make a conclusive statement on the incidence of hip fractures based on these somewhat well-researched studies from Africa[10] and postulated however that among the black population in America, the rates of hip fractures is lower in the African population than in the western population.

This study, therefore, is aimed at establishing the pattern of hip fractures in a major referral hospital in Ghana that serves a population of over four million people. The findings of this study will enable planning and better management of these injuries in the various medical centers in the country.

Materials and Methods

This is a retrospective study of patients with hip fractures admitted to the Korle-Bu Teaching Hospital, Accra, Ghana, and a major referral center in the country over a period of ten years (2007-2016) following permission from the hospital. Hip fractures in adults aged 18 years and above, resulting from trauma, fragility and pathological mechanisms were included in the study. The medical records of 929 patients with a definitive diagnosis of hip fractures were obtained from the record office of the Orthopaedics unit.

The review documented from these records, the age, sex, mechanism of injury (either from a fall and from road traffic accidents involving pedestrian versus motor vehicle, pedestrian versus motor bicycle), and the type of hip fracture (either intracapsular or extracapsular hip fractures) confirmed radiologically by use of a pelvic x-ray.

The data were analyzed using the Statistical Package for Social Sciences (SPSS version 24). Analyses explored the strength of the association between sex; age, mechanism of injury and type of hip fracture and also looked at the trends over the ten-year period and the results presented using tables, figures, and graphs. Association between outcome variables (hip fractures across age and sex groups) were determined using Chi-squared test with significance determined at p-value < 0.05.

Results

There were 492 (53%) females and 437 (47%) males during the study period with a female to male ratio of 1.13:1.0. The ages ranged from 20 to 105 years with an overall mean (± SD) age of 72.2 (±14.4) years. The age groups, frequency, and percentages are presented in Table 1

It was found that about 92% of the hip fractures occurred in patients 50 years and above. The annual trend of hip fractures from 2007 to 2016 irrespective of the age and sex is shown in Fig.1. There was an increase in the total number of cases from 2007, peaking around 2012 (125 cases) and this was followed by a gradual reduction from 2013 (94 cases) and 2016 (60 cases).

Table 2 shows a cross-tabulations of age (grouped into below 50, 50-69 and above 70 years) and sex versus fracture type and mechanism of injury to determine any association among these parameters. There was a highly significant association between age and mechanism of injury ($X^2 = 492.10$, $p < 0.001$, $\Phi = 0.73$) and moderately significant association between sex and mechanism of injury ($X^2 = 39.50$, $p < 0.001$, $\Phi = 0.21$). There was no significant association between age or sex and the type of hip fractures in this study.

Table 1 Age, frequency and percentage of study population from 2007 to 2016

Age group (years)	Frequency	Percentages (%)
20-29	9	1.0
30-39	23	2.5
40-49	44	4.7
50-59	87	9.4
60-69	157	16.9
70-79	288	31.0
80-89	245	26.4
90-99	71	7.6
Above 100	5	0.5
Total	929	100

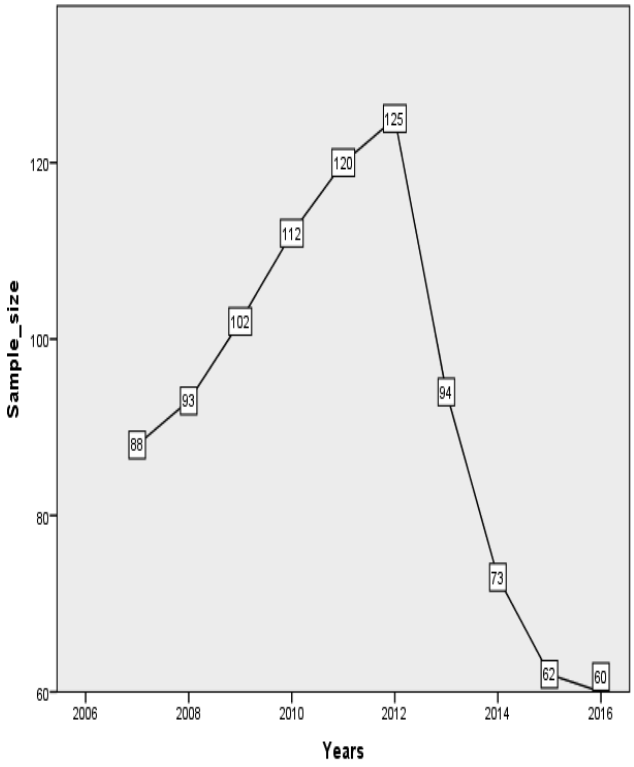

Fig 1. Annual trend of hip fractures from 2007 to 2016

Mechanism of injury

Majority of the patients (78.1%, n=726) sustained their injury as a result of a fall with 203 (21.9 %) resulting from road traffic accidents. The accidents were mainly due to passengers in motor vehicles, persons versus cars and persons versus motor bicycle.

Fig. 2 shows the annual sex pattern of the mechanism of injury over the 10-year period. For both sexes, the fall rates were higher than hip fractures resulting from road traffic injuries. Between 2014 and 2016, almost all the cases in the sexes (95.4% of females and 88.4% of males) were fall related.

A cross-tabulation of age and sex versus mechanism of injury was obtained and it was observed that a statistically strong association existed between age and mechanism of injury (X^2 = 492.10, p < 0.00, Φ =0.73) and also, between sex and mechanism of injury (X^2 = 37.50, p < 0.00, Φ =0.21), (see Table 2). Road traffic related injuries were higher among patients below 50 years whereas falls were higher in patients above 50 years.

Types of hip fractures

Four hundred and ninety (52.7%) and 439 (47.3%) of the cases were extracapsular and intracapsular types of hip fractures respectively as shown in Fig. 3.

Fig. 4 shows the sex pattern of the different types of hip fractures during the period of this study. Majority of females had the predominantly extracapsular type of fracture except for 2012 and 2014 when the cases were almost the same. However, males had almost equal numbers of both fracture types over the 10-year period. The ratio of females to males with intracapsular hip fractures was 1.1:1.0 and that of extracapsular hip fractures was 1.2:1.0 respectively. The female to male ratio of the combined fracture types was 1.1:1.0. We did not find any significant association between age (X^2 = 4.97, p = 0.84, Φ =0.07) or sex (X^2 = 1.25, p = 0.26, Φ =0.04) and types of hip fractures (see Table 2).

Table 2. Results of Chi-square Test and Descriptive Statistics for Mechanism and fracture type by Sex and Age

	Fracture Type **Extracapsular** **Intracapsular**		**X^2 (p-value)**	**Mechanism** **Fall**	**RTA**	**X^2 (p-value)**
Sex Male Female	222(50.8%) 268(54.5%)	215(49.2%) 224(45.5%)	1.25 (p=0.26) Df=1 Φ =0.07	302(69.1%) 424(86.2%)	135(30.9%) 68(13.8%)	39.50 (p<0.001*) Df=1 Φ =0.21
Age Below 50 50-69 Above 70	49 (64.5%) 122(50%) 319 (52.4%)	27 (35.5%) 122 (50%) 290 (47.6%)	4.97 (p=0.84) Df= 2 Φ =0.07	2 (2.6%) 127 (52%) 597(98%)	74(97.4%) 117 (48%) 12 (2%)	492.10 (p<0.001*) Df=2 Φ =0.73

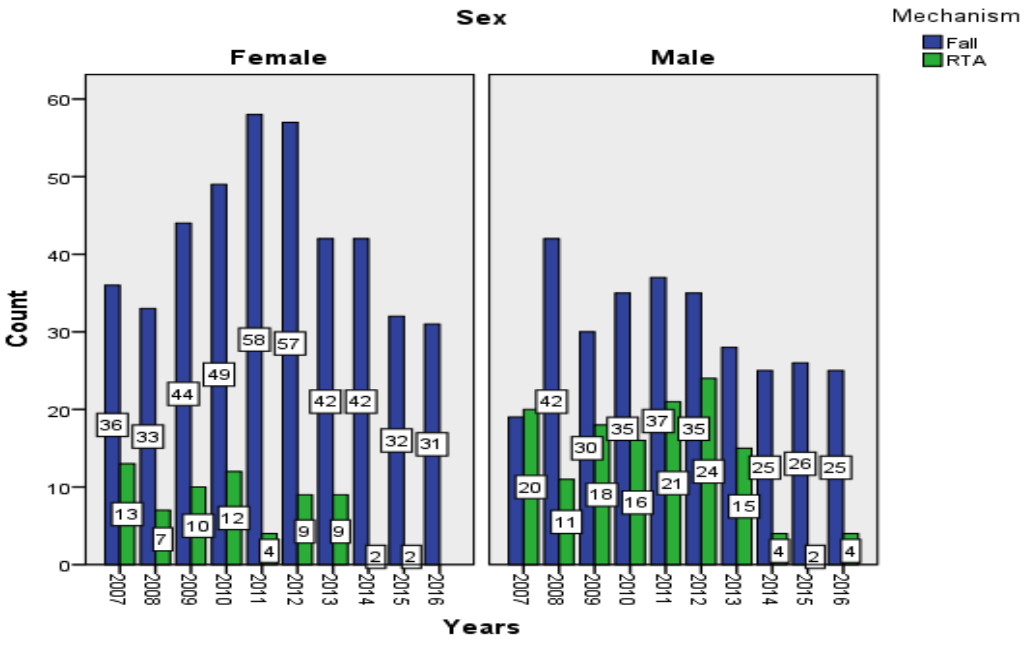

Fig. 2 Sex pattern of the mechanism of injury from 2007 to 2016

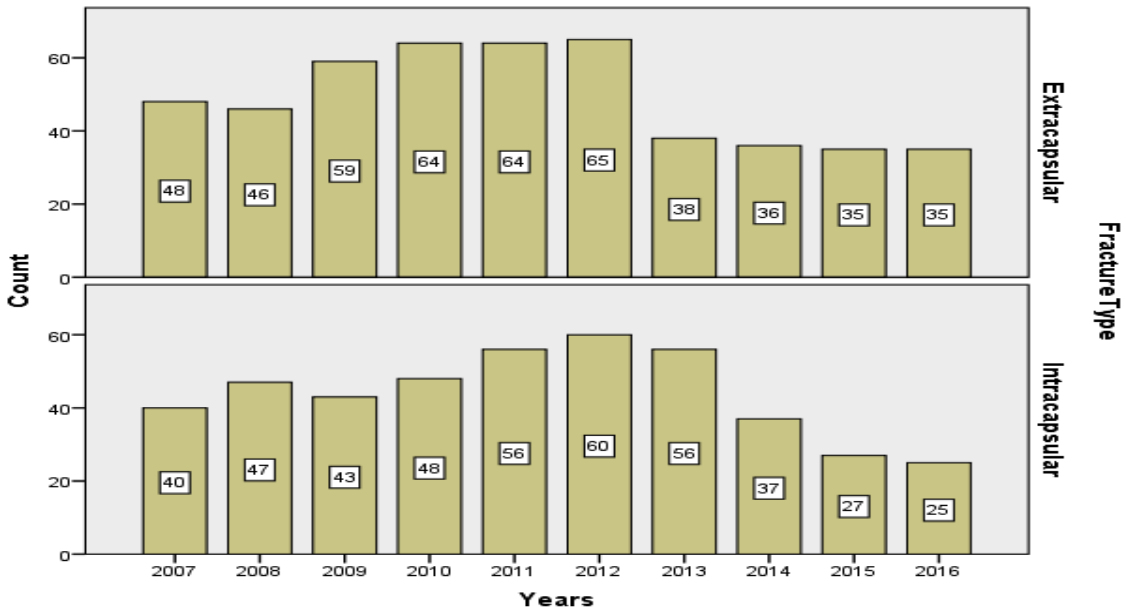

Fig. 3 Annual cases of extracapsular and intracapsular hip fractures from 2007 to 2016

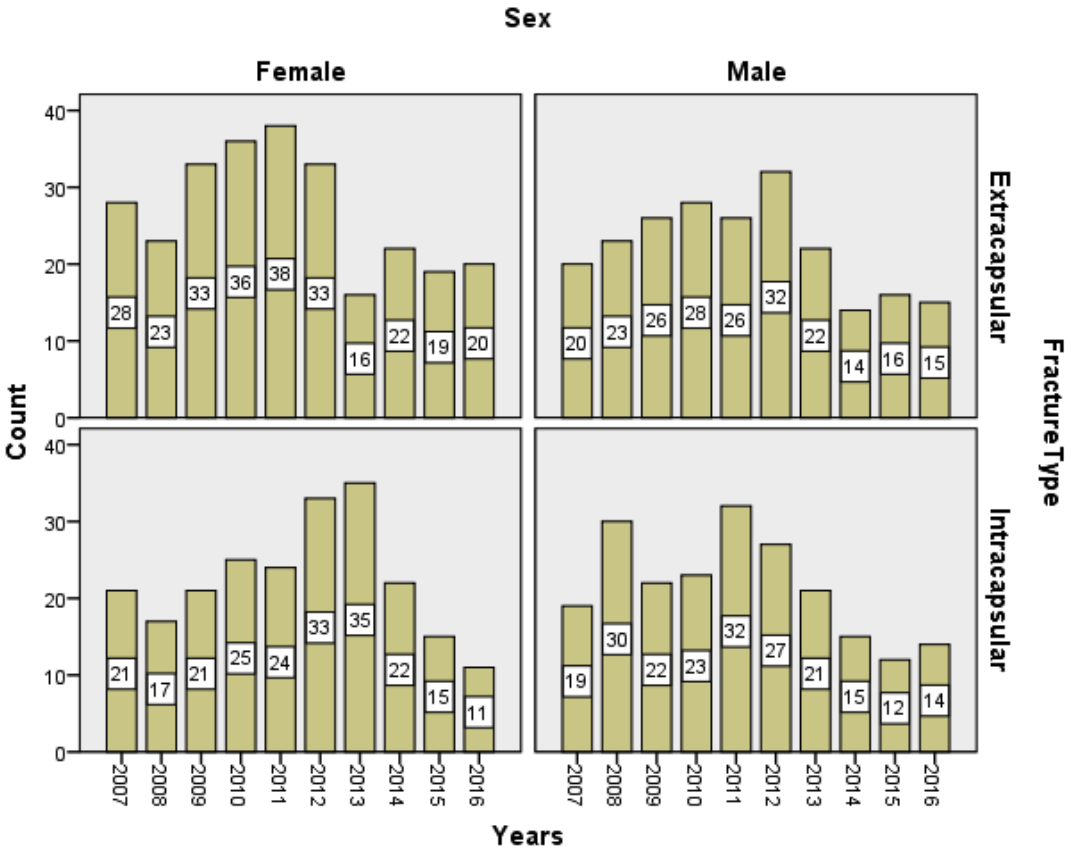

Fig. 4 Sex pattern of extracapsular and intracapsular hip fractures from 2007 to 2016

Discussion

Hip fractures have become a major public health issue in the United States and most parts of the world and are associated with significant socioeconomic implications[11-13]. These fractures are classified as either intracapsular (femoral neck fracture) or extracapsular (comprising of intertrochanteric and subtrochanteric)[14].

This differentiation is of prognostic value as the intracapsular fractures are prone to complications such as avascular necrosis from the disruption of the blood supply to the head of the femur, malunion and nonunion as the femoral head provides poor anchor for fixation devices as a result of the fragile cancellous bone it contains[15,16]. However, extracapsular hip fractures especially intertrochanteric type occurs in a well vascularized and is thus not associated with the complications of the intracapsular fractures, as they do not interfere with the blood supply[17]. They, however, are prone to shortening and malunion due to the deforming forces and the quality of bone in this region of the femur as one age [14].

Our study found about 91.8% of hip fractures occurred in patients older than 50 years. This finding may be associated with osteoporosis as one grows older especially in postmenopausal women[(18, 19)]. The general belief is that hip fractures especially those that are due to fragility mainly occur in women[20, 21]. We, however, found almost an equal number of cases in females and males. This is contrary to the high incidence in males (59.5%) than females (40.5%) found by Tsabasvi et al from Tanzania[22]. It, however, agrees with the suggestion by Dhanwal et al that the sex incidence of hip fractures vary from one geographical area to another[23]. The observed variations may also be due to factors other than sex such as environmental (diet, alcohol, smoking, and lack of exercise) as well as genetic factors[24].

The Trend of hip fractures

There is a scarcity of data that analyzes the trend of fragility fractures in Africa[22]. Tsabasvi et al found an increase in the number of cases of hip fractures in their Tanzanian hospital over a 5 year period[22]. This study found an increase in the number of cases from 2007 to 2012 followed by a gradual reduction between 2013 and 2016. As of 2012, Korle Bu Teaching Hospital used to be the main facility in the city that managed hip fractures. After this period, two other hospitals started managing these injuries in the city with an increasing number of orthopaedic surgeons being available in the Country. There was also an increased awareness creation on road safety, increasingly good road networks and education on fall prevention and this could account for the observed trend.

Interestingly, Brauer et al found a similar trend, however, they assigned the increased use of bisphosphonates, vitamin D, and calcium supplementation, decreased alcohol intake, fall awareness, and exercise as the reasons for their observed trend[7].

Mechanism of injury

It was apparent from this study that the major cause of hip fractures in our environment was fall (78.1%) and these are low energy injuries occurring in the elderly population with osteoporosis. Fall is common among the elderly and every year about a third of elderly people living independently fall out of which about 10% sustain hip fractures[25]. It is a significant cause of morbidity and mortality [26, 27], with an annual mortality rate of 12% to 37%[(26, 28)].

The other factor (21.9%) was because of road traffic-related injuries. These are high impact energy resulting from accidents involving passengers in vehicles, person versus vehicles and person versus motor bicycles. Ghana, like most developing countries around the world, lacks good public transport system. The use of motor bicycles as commercial entities for ferrying people is on the rise. There is poor road network system, poorly maintained vehicles and recklessness on our roads involving drivers, passengers and pedestrians have led to increased accidents on our roads and with this an increased rate of road traffic-related injuries of which hip fractures are part. Similar reasons were adduced by Solagberu et al in Nigeria[29].

It was also found that there was a statistically significant association between the mechanism of injury and sex ($X^2 = 39.5$, $p<0.001$, $\Phi=0.21$). Younger males and females usually sustained their injury from high-energy trauma. This finding agrees with three other studies from Africa[22, 30, 31].

Type of hip fracture

There was almost an equal number of extracapsular and intracapsular types of hip fractures over the 10-year period. Among females, the extracapsular fractures especially intertrochanteric type was predominant. In males, however, no difference existed between the two types. This study wholly agrees with that of Bjorgul et al [32] and partly agree with Karagas et al[33], who found an increased number of hip fractures among white women but not white men or blacks of either gender.

The female to male ratio for both extracapsular (1.2:1.0) and intracapsular (1.1:1.0) hip fractures were also almost equal. The reason for this similarity is not apparent but could represent a similarity in the rate and type of bone loss among both sexes in Ghana. This is contrary to the findings in the study by Brunner et al[34] which indicated that the intracapsular type was about 3 times more common in women and the intertrochanteric extracapsular type had a female to male ratio of 3:1.

There was no significant association between the sex and the fracture type or between age and fracture type (X^2 as indicated in Table 2). These findings were consistent with that of Tsabasvi et al[22].

In addition, the analysis did not find any significant association between age and sex of patients who

sustained hip fractures. According to a study done by Mayhew et al[35], there is substantial thinning of the already thin cortical zone of the superior aspect of the femoral neck. This happens more in females and to a significantly lesser extent in males and this affects independent of osteoporosis, the ability of the femur to absorb energy. This could probably account for our observation.

Strength and limitations of this study

One of the strengths of this study is that it adds to the limited studies done in the field of hip fractures in Africa. To the best of our knowledge, this is the first study to look at the trend of hip fractures over a ten-year period in Ghana. It will contribute to understanding the main causes of hip fractures in the country and beyond. It will also help with the formulation of policies towards prevention and management of patients with these injuries.

The limitations of the study are that it was a single center study and it may not represent the national trend. We did not also look at the incidence and treatment outcomes of these fractures. There is the need therefore to conduct further studies that involve all hospitals with orthopedic care services to ascertain the national trend.

Conclusions

This study shows that hip fractures are common in both males and females and falls constituted the major risk factor especially in patients above 50 years. There was an increase in the total number of hip fractures from 2007 to 2012 followed by a gradual fall from 2013 to 2016 and this could be due to the creation of awareness on the risk factors around that period. It was observed that a significant association existed between age, sex; and mechanism of injury. These findings would help in the planning and management of patients with hip fractures, as the associated morbidity and mortality are high. It is recommended that a nationwide analysis is done to ascertain the real national incidence.

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ADVERSE EVENTS FOLLOWING IMMUNIZATION (AEFI) REPORTING IN A RURAL DISTRICT IN GHANA

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Abstract

Background: Even though vaccines used in routine childhood immunization programmes are safe, adverse events following immunization (AEFI) may occur. These events must be recognized for prompt and effective response. This can contribute to success of the immunization programme and sustain interest of the public in vaccination.

Methods: A descriptive cross-sectional study comprising primary and secondary data collection methods were used for the study at Jaman North District in Ghana. The secondary data was extracted from immunization reports using a Microsoft excel spread sheet. The primary data was obtained from respondents using structured interview questionnaire. Simple random sampling was used to select caregivers and health workers were purposively selected. The data was analyzed using Statistical Package for Social Sciences (SPSS) windows (version 21.0).

Results: A total of 140 mothers or caregivers and 47 health workers were studied, with mean age of 27.8 years in each group. The rates of AEFI ranged from 0.02% for pneumococcal vaccine to 0.14% for pentavalent vaccine. In all, 63.8% of the health workers could not define AEFI, and 91.5% of the health workers do not use anaphylactic pack at immunization sessions. Majority (95.7%) of the participants agreed that poor AEFIs monitoring can lead to reduction in immunization coverage. AEFI training for health workers had a strong association ($p<0.001$) on their ability to identify AEFIs. The study indicated that mothers or caregivers were knowledgeable in many of the indicators of AEFI. In all, 93.7% of mothers or caregivers indicated that attitude of health workers was very good.

Conclusion: The study revealed low (<1%) AEFI reporting rate by mothers or caregivers. Only 36.2% health workers had knowledge with respect to definition of AFEI. The study indicated that more than a third of mothers (36%) were of the view that reporting of AEFIs can lead to personal consequences. Increased national efforts at surveillance for AEFI is imperative.

Key Words: Adverse Events Reporting, Immunization, Vaccination, Rural District

Introduction

Background: The goal of immunization is to protect the individual and the public from vaccine preventable diseases. Vaccines used in national immunization programmes are extremely safe and effective but no vaccine is 100% safe and adverse events following immunization could occur. In addition to the vaccines themselves, the process of immunization is a potential source of adverse events[1]. Thus, AEFI is any untoward medical occurrence which follows immunization and does not necessarily have a causal relationship with the usage of the vaccine.

Some children experience AEFIs ranging from mild to life threatening side effects but rare illnesses. In the majority of cases, adverse events are merely coincidence, in others they are caused by the vaccine or error in the administration of vaccines or sometimes, there is no relationship at all[2]. The AEFIs can be categorized into five main types, vaccine product-related reaction, vaccine quality defect-related reaction, immunization error-related reaction, coincidental event, and immunization anxiety-related reaction[3].

Immunization safety has become important in the immunization programme since it can affect the utilization of services if not monitored and managed appropriately. Unlike drugs, the expectations from vaccinations are much higher and problems arising from vaccine or vaccinations are less acceptable to the general public. There is therefore the need to actively monitor all AEFIs and respond to them appropriately[4].

The expanded program on immunization (EPI) was introduced in Ghana in 1978 with a total of six antigens-BCG, measles, diphtheria-pertussis-tetanus (DPT) and oral polio for children under the age of one. Currently, the EPI programme in Ghana has increased the number of vaccines to a total twelve (12) which include BCG, oral polio, diphtheria-pertussis-tetanus-hepatitisB, Haemophilus influenza type B- (DPTHepBHib), measles, rubella, pneumococcal, yellow fever and rotarix for children under one year[5].

In the Jaman North District where this study was conducted, immunization is carried out routinely on

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both static and outreach points. Health workers who conduct immunization services in the district have the responsibility of identifying and reporting AEFIs to the district EPI focal person for onward submission to the region.

Methods

Study site

The study was conducted in all the six sub districts within the Jaman North District of the Brong Ahafo Region of Ghana during the period 2013-2015.

Sampling procedures

The study used a descriptive cross-sectional study involving a survey and review of secondary data. The descriptive cross-sectional was used to collect relevant information from both mothers with children under the age of one year and health workers who conduct EPI services.

A multistage cluster random sampling strategy was used to select the mothers while health workers were purposively selected. The number of respondents to be included in this study was distributed proportionally according to the population of children under one year in the various sub districts. Each of the six sub districts was considered as a cluster. Simple random sampling was used to select the first cluster (sub district) based on the district's immunization itinerary. All outreach points in the various sub districts were selected using the sub district's immunization itinerary. At the outreach point, simple random sampling was used to select a total of 140 caregivers. The list of all health workers who conduct EPI services and their respective health facilities were obtained from the district EPI coordinator. At the health facilities all eligible health workers present during the study period and consented to participate were enrolled.

Data Collection procedure

Two main approaches were employed, review of secondary data and interviews with a structured questionnaire. The structured interview questionnaires were used to interview health workers and mothers or caregivers while the secondary data collection involved the review of EPI reports and AEFI case-based forms in the District. The AEFI case-based forms included types of AEFIs and the vaccines involved. Client exit interview was used to collect information from the mothers or caregivers after the immunization session using the structured interview questionnaire.

Data Analysis

Microsoft excel spread sheet was used as a data compilation sheet for the records review. Data obtained were analyzed using the Statistical Package for Social Sciences (SPSS) windows (version 21.0) by simple descriptive statistics.

Categorical variables were summarized into frequencies and proportions, continuous variables such as age was re-categorized into age groups. Frequency counts of all responses were converted to frequency tables.

Results

Socio-demographic characteristics of the study population

In Tables 1 and 2 a total of 140 mothers or caregivers and 47 health workers studied showed the mean age of health workers was 27.0 years and that of caregivers was 27.5 years. Among the health workers, 59.6% were females, while 97.9% had tertiary education. It was observed that 29.8% of health workers had worked for only one year, 89.3% were married, 63.6% had primary or basic education and 44.3% were farmers.

Table 1: Socio-demographic information of caregiver/ mothers

Variable	Total	Percentage
Age of mothers		
16-20	26	18.6
21-25	30	21.4
26-30	38	27.2
31-35	24	17.1
36-40	16	11.4
41 >	6	4.3
Total	***140***	***100***
Occupation of mothers		
Civil/public servant	4	2.9
Farmer	62	44.2
Business woman	30	21.4
Housewife	19	13.6
Artisan	20	14.3
Others(specify)	5	3.6
Total	***140***	***100***
Marital status of others		
Married	125	89.3
Divorced	8	5.8
Widowed	3	2.1
Single	1	0.7
Separated	3	2.1
Total	***140***	***100***
Educational level of mother		
No formal education	14	10.0
Primary/basic education	89	63.5
Secondary/Technical/Vocational	32	22.9
Tertiary	5	3.6
Total	***140***	***100***

Table 2: Socio-demographic information of health workers

Variable	Total	Percentage
Age		
20-24	8	17.0
25-29	21	44.7
30-34	14	29.8
35-39	4	8.5
Total	***47***	***100***
Sex		
Male	19	40.4
Female	28	59.6
Total	***47***	***100***
Education		
Tertiary	46	97.9
Secondary/Technical	1	2.1
Total	***47***	***100***
Number of years of service		
Less than a year	2	4.3
One year	14	29.8
Two years	9	19.1
Three years	8	17.0
Four years and above	14	29.8
Total	***47***	***100***

Knowledge of Health workers about AEFI reporting

It was observed that 63.8% of the health workers could not define AEFI although 89.4% have had training or sensitization on AEFI through seminars and workshops (Table 3). In addition, 46 out of the 47 health workers were of the view that immunization error-related reactions that occur during vaccine storage, preparation and administration can lead to AEFIs. Participants described AEFI as occurrence of pain, swelling and redness (28.5%) or irritability, malaise, and systemic symptoms (14.6%) amongst others. Only 57.4% of participants indicated that AEFI should be investigated and reported within 24 hours. Majority, 91.5% indicated being familiar with the AEFI form. In all, 72.3% of the participants indicated they will manage fever as an AEFI if a mother reports to them.

Practices of Health workers about AEFI reporting

Table 4 demonstrates that 93.6% of health workers do inform mothers whose children experience AEFI to report to the health facility. In addition, 66% health workers indicated an experience in detection of AEFI. More than half of health workers, (51.8%) did not use AEFI case-based form in their reporting and 55.3% did not have AEFI reference guide at their facilities.

Almost all (91.8%) the health workers did not use anaphylactic pack and adrenaline at immunization sessions. In addition, less than two-thirds (61.7%) of them educate mothers and caregivers about AEFIs on routine basis. However, 83.0% of the participants did feel reluctant to report AEFI for fear of being blamed.

Perception of health workers about AEFI reporting

Table 5 indicates that 44.7% of the mothers and caregivers acknowledged that they will feel guilty to report injection abscess as an AEFI and 34.0% were of the view that reporting of AEFIs could lead to personal consequences. Overall, 95.7% believed that poor AEFI monitoring can lead to reduction in immunization coverage and that AEFIs can also be investigated and reported by the EPI service provider and not only the medical doctor (80.9%). Close to half (48.9%) of the participants indicated that investigating AEFI is time consuming and yet all the respondents expressed readiness to learn more about AEFI reporting and investigation.

Knowledge of mothers on AEFI and the Attitude of health workers toward mothers who report AEFI

Tables 6 and 7 show that 98.6% of the respondents have heard about AEFI and 96.4% were aware that AEFI should be reported to the health worker. Also, 96.4% were aware that treatment of AEFIs is free of charge and that 92.1% have had counselling or education about AEFI. It was observed that reporting AEFI can help improve immunization services in close to half of participants (46.4%). The most common condition that respondents will report as AEFIs after vaccination were fever, pain and swelling at site of injection.

Rate of AEFI reporting

Table 8 shows AEFIs recorded in the district were mainly associated with pneumococcal and Pentavalent vaccines for the period under review. The most common event reported in all the years was pain, swelling and redness and was mainly associated with the Pentavalent. In addition, from district records, no AEFI was recorded for BCG, Measles/Rubella, Tetanus Diphtheria, Rotarix and OPV.

Table 3: Knowledge of Health workers about AEFI

Variable	Total	Percentage
Training/Sensitization on AEFI		
Yes	42	89.4
No	5	10.6
Total	***47***	***100***
Definition of AEFI		
Any ontoward medical occurrence which follows immunization and does not have any causal relationship with the usage of the vaccine	17	36.2
Any medical event which occurs as a result of only the vaccine	11	23.4
Any issue which arises from vaccination either social or medical	8	17.0
Vaccination which leads to side effects which cannot be managed by mother	11	23.4
Total	***47***	***100***
Description of AEFIs		
Pain, swelling, and redness at site of injection	43	28.5
Refusing to breastfeed or eat	20	13.2
Irritability, malaise, and systemic symptoms	22	14.6
Diarrhoea	11	7.3
Anaphylaxis/shock	20	13.2
Type of training		
Onsite training on the job	5	10.6
Orientation through workshop and seminars	42	89.4
Total	***47***	***100***
Immunization error leading to AEFI		
Yes	46	97.9
No	1	2.1
Total	***47***	***100***
Have seen AEFI reporting form before		
Yes	43	91.5
No	4	8.5
Total	***47***	***100***
Hours within which AEFIs should be investigated		
Within 24 hours	27	57.4
Within three days	17	36.4
Within three to five days	3	6.4
Total	***47***	***100***
Management of fever as an AEFI after vaccination		
Yes	34	72.3
No	13	27.7
Total	***47***	***100***

Table 4: Practices of Health workers about AEFIs

Variable	Total	Percentage
Information health workers give to mothers when their children experience AEFIs		
Manage it in the home	3	6.4
Report to health worker or health facility	44	93.6
Total	***47***	***100***
Form used by respondents in reporting AEFIs		
AEFI case-based form	23	48.2
Referred the patient without filling form	9	18.5
EPI reporting form	15	33.3
Total	***47***	***100***
Use of anaphylactic pack and adrenaline at immunization sessions		
Yes	4	8.5
No	43	91.5
Total	***47***	***100***
Detection of AEFI by health workers		
Yes	31	66.0
No	16	34.0
Total	***47***	***100***
Reluctant to reporting AEFI for fear of blame		
Yes	8	17.0
No	39	83.0
Total	***47***	***100***
Frequency at which health workers educate mothers about AEFIs		
Routinely	29	61.7
Monthly	18	38.3
Total	***47***	***100***

Table 5: Perception of Health workers about AEFIs reporting

Variable	Total	Percentage
AEFI reporting leading to personal consequences		
Yes	16	34.0
No	31	66.0
Total	***47***	***100***
Poor AEFI monitoring leading to low immunization coverage		
Yes	45	95.7
No	2	4.3
Total	***47***	***100***
Processes involve in AEFI reporting		
Too long and time consuming	15	31.9
Not time consuming	24	51.1
Very easy	8	17.0
Total	***47***	***100***
Feeling guilty to report injection abscess for causing harm to child		
Yes	21	44.7
No	26	55.3
Total	***47***	***100***
Should AEFI investigation be conducted only by the medical doctor		
Yes	9	19.1
No	38	80.9
Total	***47***	***100***
Interest to learn more about AEFI reporting		
Yes	47	100.0
Total	***47***	***100***

Table 6: Knowledge and Reporting on AEFI in Caregivers

Variable	Total	Percentage
Ever Heard about AEFI		
Yes	138	98.6
No	2	1.4
Total	***140***	***100***
Awareness about free treatment of AEFIs		
Yes	135	96.4
No	5	3.6
Total	***140***	***100***
Importance of AEFI reporting		
To improve vaccine quality	13	9.3
Improve upon EPI services	67	47.9
Just for record keeping	2	1.4
Help manage the AEFI	55	39.3
Others(specify)	3	2.1
Total	***140***	***100***
Reasons for not reporting AEFIs		
Too busy	3	6.1
Long distance to facility	4	8.2
I don't think it is necessary	5	10.2
Condition not serious	10	20.4
Was asked to manage it the home with paracetamol syrup	27	55.1
Total	***49***	***100***
Reporting of AEFI to health workers		
Yes	135	96.4
No	5	3.6
Total	***140***	***100***

Table 7: Frequency and Attitude on AEFI among care givers

Ever had counseling/education about AEFI		
Yes	129	92.1
No	11	7.9
Total	***140***	***100***
Number of times child has been vaccinated		
Once	12	8.6
Twice	11	7.9
Three times	29	20.7
More than three times	88	62.8
Total	***140***	***100***
Child ever had AEFI		
Yes	113	80.7
No	27	19.3
Total	***140***	***100***

Table 8: Number of AEFI reported in the district 2013 – 2015

Reported Event	Pentavalent			Pneumococcal		
	2013	2014	2015	2013	2014	2015
Fever	1	0	0	0	0	0
Pain, swelling and redness	11	2	1	0	0	2
Irritability, malaise and systemic symptoms	0	0	0	0	0	0
Total Reported	***12***	***2***	***1***	***0***	***0***	***2***

Discussion

Socio-demographic characteristics of the study population

A total of 140 mothers/caregivers and 47 health workers were studied. Association between level of education of health workers and ability to identify AEFI was not significant(p=0.159). The study did not demonstrate any significant association (p=0.282) between the level of education of mothers and reporting of AEFI to health workers. In addition, there was no significant association (p=0.194) between occupation of mothers and AEFI reporting majority of whom were farmers.

Knowledge, practices and perception of health workers about AEFI

The study revealed that respondents were knowledgeable in some of the indicators while some shortfalls in knowledge were identified. Majority of the respondents have had training or sensitization about AEFIs through workshops and seminars. This is in contrast with a study conducted in Zimbabwe which indicated that only 6% of health workers have had training on AEFI[9]. One observation was that AEFI training for health workers has a strong association (p=0.001) on their ability to identify AEFI. It was evident that health workers who have had previous training on AEFI are more likely to identify AEFI; hence the need to build the capacity of health workers who provide EPI services on AEFI. Few respondents were able to provide the correct definition of AEFI which is similar to a study in Zimbabwe [6].

Majority of the participants were knowledgeable about AEFIs associated with vaccine storage, preparation and administration. This is in contrast with a study in Kenya in 2014 which found a small proportion of the respondents had knowledge on the causes of AEFI[8]. Respondents' knowledge about conditions that should be reported as AEFIs was not encouraging since all the responses were far below 50%. It was observed that most respondents will not recognize systemic symptoms such as refusal to breastfeed or eat, irritability, malaise, diarrhoea, anaphylaxis or shock as AEFI after vaccination. In contrast, a study in 2013 in Zimbabwe showed that anaphylaxis, febrile convulsions, limb swelling, high fevers and skin rashes were the conditions recognised by participants as indicative of AEFIs[11].

Majority of the participants were familiar with the AEFI reporting form and agreed with findings from a study in 2013 in the United States[14] which showed weak association (p=0.241) between years of service of health workers and having seen an AEFI reporting form before. Close to half of the participants did not know that AEFIs should be investigated and reported within 24 hours after detection. This demonstrated limited knowledge on the timing and reporting of AEFIs per recommendations by the WHO. It was also observed that all participants knew the importance of AEFI reporting and that reporting are to improve immunization services, record keeping and the target group involved. This study found that most caregiver were of the view that AEFIs should be investigated and reported by both the EPI service provider and a medical doctor and not only the medical doctor. This was in contradistinction to a study in Brazil in 2010, which revealed that nurses working in primary health care units showed little interest in AEFI surveillance because of its complexity[12].

Majority of the health workers do tell mothers/caregivers whose children experience AEFIs to report to the health facility for management. Most of the respondents have ever detected and reported an AEFI before to the next level, even though most did not use AEFI case-based form for reporting. This finding disagreed with that of a study in Kenya and Zimbabwe which indicated most health workers had never diagnosed a patient with an AEFI[6,8].

Interestingly, majority of the caregivers were willing to report AEFIs, unlike the observation from a 2013 study in Uganda where health workers were usually reluctant to report AEFIs due to the possible negative repercussions and fear of being blamed[10]. Moreover, some studies in United States and Nigeria showed significant proportion of respondents felt reluctant to report AEFIs because it could lead to personal consequences, and punitive actions[11,13]. Gender disparities in willingness to report AEFI was observed in this study. Female health workers were more likely to report AEFIs compare to male health workers (p=0.029).

Another undesirable observation was that, most facilities did not have AEFI reference guide and that almost all health workers did not use anaphylactic pack of adrenaline and hydrocortisone for emergencies during immunization services. This was mainly because the medications were not available.

Knowledge of mothers or caregivers about AEFI

Many of the mothers/caregivers knew about AEFIs indicators, this was, however, unrelated to their educational level (p=0.945). Majority of caregivers have reported AEFI before and were aware that treatment for

AEFIs is free of charge. Most have had counselling and education on AEFIs in contrast to a study in Zimbabwe where only 43.5% of caregivers had received education on AEFI[6]. Caregivers in this study were able to identify what will constitute an AEFI, compared to Mukkur et al., 2013 in Nigeria where a significant percentage of the mothers could not mention any of the adverse events that may follow immunization[15].

Rate of AEFI reporting

Generally, AEFIs were reported for only Pentavalent and Pneumococcal vaccines for the period 2013 to 2015. The low rate of AEFI reporting could likely be that most of the health workers did not know the definition of AEFI. This is supported by evidence from Zimbabwe that health workers did not know the definition of AEFIs[6]. Most of the AEFIs recorded were associated with pentavalent, unlike studies in Colombia and United States where the rates of AEFIs reported were associated with other vaccines as well[14]. The AEFIs reported in this current study were pain, swelling and redness compared to another Ghanaian study a decade ago (2007) which had fever, common cold, cough, vomiting, and diarrhoea as the commonest reported events[7].

Limitations

Caregivers who have been through all the scheduled immunization would be more likely to experience and AEFI. The current study had some caregivers who had only accessed only some of the vaccines for their children may not be likely to have had an AEFI experience.

Conclusion

The study revealed that, the rates of AEFI reported in the district from the year 2013 to 2015 for all the various antigens were below the WHO recommendations. There were gaps in knowledge of health workers with respect to the definition of AEFI, duration of AEFI investigation, and conditions that should be reported as AEFIs. In addition, health workers did not use anaphylactic pack at immunization sessions regularly as recommended. It is, however, important to observe that most caregiver believed poor AEFIs monitoring can lead to reduction in immunization coverage. The general challenges with immunization surveillance deserve unreserved attention to sustain interest in EPI services.

Abbreviations

Adverse events following immunization (AEFI), Bacille Calmette-Guerin (BCG), Diphtheria-pertussis-tetanus(DPT), Diphtheria-pertussis-tetanus-hepatitis B, Haemophilus influenza type B (DPTHepBHib), Oral polio vaccine(OPV), Statistical package for social sciences(SPSS),

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AGGRESSIVE PLASMA CELL MYELOMA AS AN UNDERLYING CAUSE OF PARAPARESIS IN AN UNUSUALLY YOUNG MALE PATIENT

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Abstract

Plasma Cell Myeloma, also called multiple Myeloma, is a haematological malignancy characterised by the proliferation of malignant plasma cells with an associated monoclonal paraproteinemia. The disease is described to have a median age of diagnosis in the 7th decade of life and rare below the 4th decade. We report a case in which the patient was first diagnosed as having Multiple Myeloma at the age of 29 years. The patient had been having symptoms for at least 5 months prior to the diagnosis being arrived at. His earliest symptoms were non-specific: malaise, low grade fever, easy fatigability. These were followed by palpitations, recurring bipedal swelling, polyuria and two months later gnawing lower back pain. Shortly after, he experienced sudden inability to walk without support. The patient reported to us that he had visited a number of primary care facilities where he had full blood counts done as well as x-rays of the lumbosacral spine but was apparently told that apart from having moderate anaemia, his lumbo-sacral X-ray findings were not significant. At the last facility he visited before presenting to our hospital, he was told that he had severe anaemia due to chronic kidney disease. At presentation, a careful review of his history together with his laboratory investigations which included a FBC, blood film comment, BUE/Cr, and X- ray of the thoracolumbosacral spine was suggestive of Multiple Myeloma. Hence with his first blood film comment which showed mild rouleaux formation a bone marrow aspirate was requested. An ESR had not been done. The marrow showed plasma cell infiltration of 65%. Serum protein electrophoresis showed an M component of 8g/L while a serum free light chain assay revealed an increase of the lambda component of 8480 mg/L (normal: 5.71-26.30). A repeat x ray showed lytic lesions in the pelvic girdle, spine, shoulders and sternum. Patient was started on oral and intravenous hydration, renal dialysis, Zoledronic acid, chemotherapy with Vincristine, Adriamycin, Dexamethasone and Thalidomide, physiotherapy and thoracolumbar bracing. Patient responded well to treatment.

Key Words: Plasma Cell Myeloma, Young African Male, Aggressive

INTRODUCTION

Plasma cell myeloma is described as a disease of the older age brackets and is rare below the age of 30 years. A young patient presenting with anaemia, kidney disease, lower back pain with evidence of vertebral collapse may be considered to have other underlying causes such as Non Hodgkin Lymphoma, Disseminated Tuberculosis or even Renal Osteodystrophy rather than Plasma Cell Myeloma. This case of Plasma Cell Myeloma is being reported foremost because of its unusually aggressive presentation in a young African adult male and secondly, to highlight the need to consider plasma cell myeloma as a possible diagnosis even in young patients should their constellation of symptoms fit the picture.

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Case Report

The patient was a 29 year old male with a 5 month history of easy fatigability, gnawing back pain and non-traumatic sudden onset of inability to walk without support. His symptoms were preceded by malaise, low grade fever, polyuria, recurrent abdominal pain and bipedal swelling of at least two months duration. Patient had visited several primary care and secondary medical facilities prior to his inability to walk where investigations done including x rays of the lumbosacral spine were apparently unrevealing.

He was admitted at one of the several secondary care facilities after he lost his ability to walk for about two weeks and later referred to our hospital with a diagnosis of Chronic Kidney Disease. The patient reported that he was transfused a unit of blood while on admission at the last hospital before being referred. Information on his pre-transfusion haemoglobin concentration from the referral centre was not provided. There was no family history of haematological malignancy or any other neoplasm when his history was further probed. There was no history of exposure to radiation or industrial chemicals. He had no past hospital admissions prior to current illness and no known history of chronic medical illness. He was born to teenage parents who were separated.

On examination, he looked chronically ill with evidence of weight loss, pallor and mild dehydration. At the time, there was no pedal oedema. Chest examination revealed signs of consolidation in the left lower posterior lung base while the only significant cardiovascular finding was a displaced cardiac apex to the 7th left intercostal space in the midclavicular line. His abdomen was full and soft with mild epigastric tenderness but no organ enlargements. He had a gibus in the region of the 5th lumbar vertebra. Power was normal in the upper limbs but 4/5 in the lower limbs with normal reflexes, no sensory level and normal anal sphincter tone.

His lab results were as follows:

RBCs	1.53*	(3.8-4.8) 10^{12}/L
HB	5.1*	11-16g/dL
MCV	100.7	80-100 fL
MCHC	33.1	3-36g/dL
Platelet	144	(150-400) 10^9/L
WBC	9.76	(2.6-8.5) 10^9/L
Neutrophil	5.02	(1.5-7) 10^9/L
Lymphocytes	3.08	(1-3.7) 10^9/L
Monocytes	1.42	(0-0.7) 10^9/L
Creatinine	1147.2*	(53-123.8) umol/L
Urea	49.95*	(2.14-7.12)mmol/L
BUN/Cr	43.85	(8-36)
Albumin	43	34-50 g/L
Total protein	72.8	62-85 g/L
Globulin	29.78	20-48g/L
Total Bilirubin	20.19	3.4-25.70 umol/L
Direct Bilirubin	6.77	0.00-10.30 umol/L
Indirect Bilirubin	13.42	1.70-17.00 umol/L
AST	57.5	5.0-34 U/L
ALP	429.3*	53-270 U/L
ALT	50.5	10.0-50.0 U/L
GGT	179.1*	9.0-36.0 U/L

eGFR was 5.3 mL/min/1.73m2 (CKD-EPI)

Urine routine examination showed a pH of 6, protein of 2+, blood of 2+ and 7 RBC's

Total serum calcium was 2.47mmol/L (2.15-2.50)

X-ray showed multiple collapsed vertebrae and lytic bony lesions in the pelvic girdle (Image 1), thoraco-lumbar vertebrae, sacral vertebrae, shoulder girdle and sternum.

Image 1: Pelvic X Ray

Echocardiogram showed symmetric hypertrophy of both the right and left ventricles with good ejection fraction of >70% but a grade II left ventricular diastolic dysfunction and mild tricuspid regurgitation. Differentials of Renal Heart, Amyloid Heart and Symmetric Hypertrophic Cardiomyopathy were given.

Sputum for AFB as well as Gene Xpert for *Mycobacterium tuberculosis* was negative.

An initial blood film comment requested showed mild rouleaux (image 2) and relative neutrophilia with toxic granules.

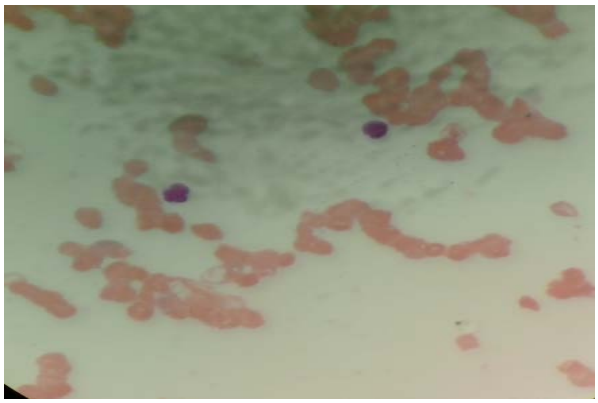

Image 2: Initial peripheral blood film with rouleaux

On the basis of a suggestive clinical picture supported by the above laboratory findings a work up to investigate for Plasma cell Myeloma was initiated which

included a bone marrow aspirate, serum protein electrophoresis, serum free light chains, serum beta microglobulin. Bone marrow aspirate done showed plasma cells in the bone marrow with a count of 65% (image 3).

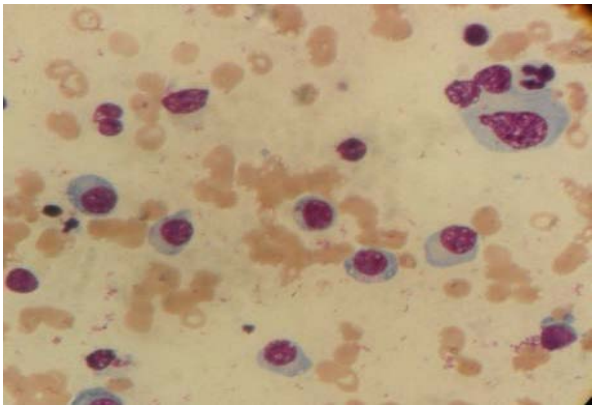

Image 3: Bone Marrow Aspirate

Plasma cells found in the peripheral blood film taken at the same time as the bone marrow aspirate was 13% of total WBC count.

Results for his serum protein electrophoresis, serum free light chain, serum beta 2 microglobulin and LDH are presented below:

Test	Result	Reference
S-Kappa Free Light Chain	52.90* mg/L	3.3-19.4
S-Lambda Free Light Chain	8480* mg/L	5.71-26.30
Kappa/Lambda Ratio	<0.01	0.26-1.65
Total Protein	79 g/L	64-83
S-Albumin	39 g/L	39.7-49.5
S-Alpha 1 Globulin	3.16 g/L	0.72-1.872
S-Alpha 2 Globulin	8.37 g/L	5.184-8.496
S-Beta 1 Globulin	4.27 g/L	4.032-6.552
S-Beta 2 Globulin	6.08 g/L	1.584-4.104
S-Gamma Globulin	5 g/L	4.464-11.088
S- 'M' Component	8 g/L	0
S- Beta 2 Micro-globulin	41 mg/L	<2.4
S-LDH	842 IU/L	120-240

Patient was started on hydration, renal dialysis, Zoledronic acid, physiotherapy and thoracolumbar brace. Definitive treatment with chemotherapy was initiated with Vincristine, Adriamycin, Dexamethasone and Thalidomide. Patient was scheduled to receive an initial 8 cycles of the treatment. Patient responded well to treatment initially but succumbed to sepsis from severe respiratory tract infection about 4 months later.

Discussion

Plasma cell myeloma is a disease consisting of systemic symptoms and signs resulting from the clonal proliferation of malignant plasma cells[1].

The median age of diagnosis is about 66 years for people of black African descent and 70 for people not of black African descent[2]. The disease has a low incidence below the age of 40 years and is even more rare below the age of 30 with a 0.3% frequency[3,4]. The median age at diagnosis is about 62 years for men and 61 for women[5].

The most common abnormalities found in at least two-thirds of patients at diagnosis are: evidence of monoclonal protein in serum, evidence of clonal plasma cells >10% in bone marrow, anaemia, bone involvement including pain and lytic lesions. Less frequent abnormalities are renal disease, light chain amyloidosis and hypercalcaemia[6]

Most reported case series have shown similar presentation of the disease at diagnosis as well as similar response to treatment among the various age groups[7]; however, a few other reports have described an indolent evolution of the disease in young male adults with a better survival despite poor response to therapy[8].

Our patient did not only have the typical presenting abnormalities but also the less frequent presenting abnormalities such as light chain amyloidosis evidenced by the cardiac amyloid disease (10%), and renal insufficiency (20%)[6]. It was also apparent that the clinical course of our patient's presentation was rather an aggressive one unlike what would be expected [8]. Our patient's symptoms evolved rapidly over a course of 5 months from general non-specific symptoms to the more elaborate constellation of vertebral collapse, kidney disease, symptomatic anaemia, cardiac amyloid and susceptibility to infections. At the time of diagnosis, the patient was staged III with the International Staging System.[6]

In tropical jurisdictions, several other competing diagnoses are likely to be the focus of diagnostic investigation with respect to the age of the patient and duration of onset of symptoms. Our patient for instance was investigated for at least malaria, urinary tract infection, and tuberculosis at various primary care facilities at the time the symptoms and signs were still evolving. By the time he was referred for tertiary medical care, he had developed significant anaemia, renal impairment and paraparesis from vertebral collapse.

We also considered among other possible underlying pathologies, the diagnoses of Non Hodgkin Lymphoma, Disseminated Tuberculosis and Hyperparathyroidism. However, when we had sufficient evidence that the patients presentation was not due to the other possible diagnoses, we considered the possibility of plasma cell myeloma despite the young age of the patient, because the constellation of signs and symptoms along with preliminary lab investigations including a blood film examination were suggestive of Myeloma.

Although the first peripheral blood film examined did not show any plasma cells, our index of suspicion for Multiple Myeloma was heightened due to the suggestive clinical presentation. A week later, when a repeat peripheral blood film together with bone marrow aspirate were examined, plasma cells were found in both samples. The other investigations to help confirm the clonality of the cells and for prognostication were then carried out. The monoclonal protein component found was light chain kappa; the most common expected finding being IgG, followed by IgA, then *k* or *l* light chain[7].

Conclusion

Whenever a patient's clinical findings fit the picture of multiple myeloma, there should not be a hesitation to consider myeloma as a diagnosis irrespective of the age of the patient.

Acknowledgements

The case report was written by Dr N. Lovi. All authors have read and agreed to the final version of this manuscript and have equally contributed to its content and the management of the case.

Disclosure Statement

There is no financial support or other relationships between the authors and any organization or professional bodies that poses any conflict of interests.

Competing Interests

Written informed consent has been obtained from the patient for publication of this case report and any accompanying images**.**

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SLEEPING SICKNESS

(Trypanosomiasis)

Cycle

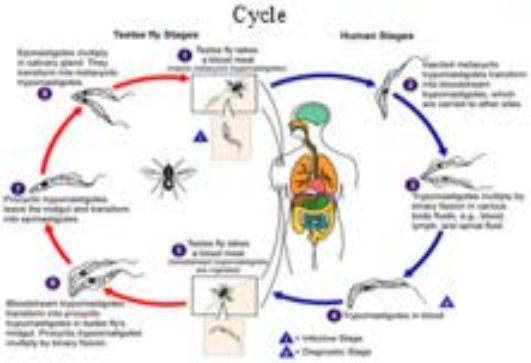
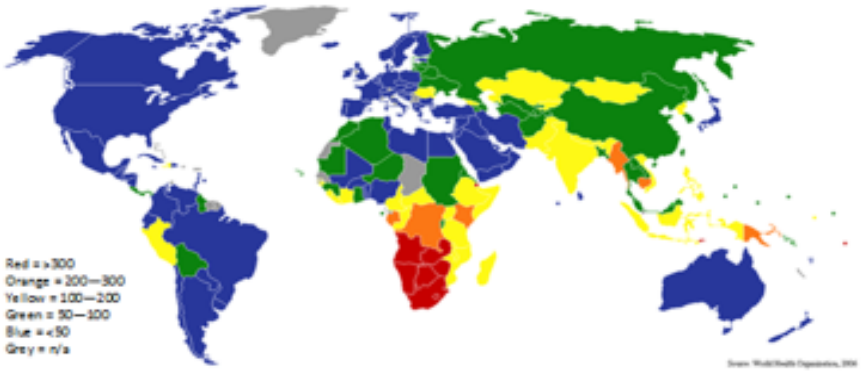


Fig. 15. The trypanosomiasis epidemic in Ghana 1930-50. The pairs of circles indicate the prevalence per cent. of infection in different localities. The first circle shows the incidence on the initial examination in that area, the second relates to the last survey of the period. The larger and broken circles refer to overall first and last prevalences in Upper and Northern Ghana together and Brong-Ahafo and Ashanti together. On the hatched side of the line are districts surveyed. The two epidemic areas recognized early in this period are cross hatched.

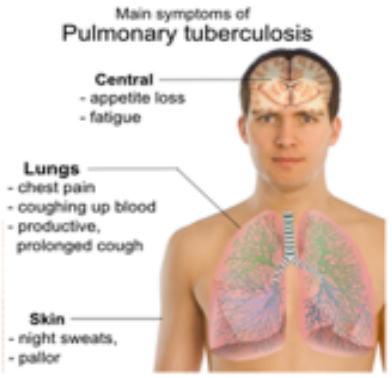
Sleeping Sickness is caused by a parasite, the trypanosome. Two species of trypanosome are recognized in man, T. gambiense and T. rhodesiense. The parasite is transmitted from man to man by a vecor, the tsetse fly. The common tsetse species in Ghana Glossina palpalis

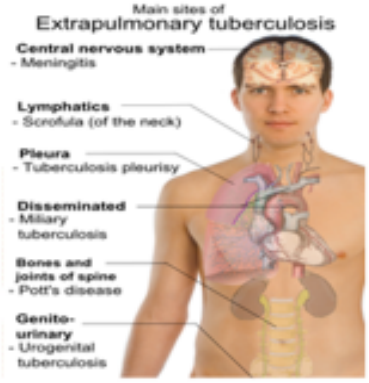
There was an epidemic of sleeping sickness in Ghana in the 1930s. In 1935, the government set up a committee to consider the problem. In 1937, the trypanosomiasis campaign was established, with its headquarters in Gambaga. The campaign (what campaign) was successful in reducing the incidence of the disease.

TUBERCULOSIS



World map showing reported cases of tuberculosis per 100,000 citizens. Red = >300, orange = 200—300, yellow = 100—200, green = 50—100, blue = <50 and grey = n/a





Tuberculosis (TB) is a disease caused by a small bacterium called Mycobacterium tuberculosis. The most common form of the disease is when it damages the lungs, but it can affect many parts of the body, when it is called extra-pulmonary disease. TB is highly infectious and is usually caught by breathing in bacteria from the air. People with untreated disease in their lungs or throat expel the bacteria as small droplets when they cough, sneeze or even during talking. These tiny droplets can remain suspended in the air for long enough to be inhaled by other people in the vicinity.

When the disease becomes active, 75% of the cases are pulmonary TB. In the other 25% of active cases, the infection moves from the lungs, causing other kinds of TB, collectively denoted extra-pulmonary tuberculosis.

People with damaged immune systems have a much higher risk of developing TB disease. TB is the leading cause of illness and death in people living with HIV. HIV/AIDS and TB are so closely connected that the term "co-epidemic" or "dual-epidemic" is often used to describe their relationship.

Treatment for TB uses antibiotics to kill the bacteria. The two drugs most commonly used are rifampicin and isoniazid. However, instead of the short course of antibiotics typically used to cure other bacterial infections, TB requires much longer periods of treatment (around 6 to 12 months) to entirely eliminate mycobacteria from the body.

GHANA COLLEGE OF PHYSICIANS AND SURGEONS

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Ministries-Accra

May, 2018

ELECTION NOTICE

Notice is hereby given of the election of President of the College and Vice Presidents for the Division of Physicians and Division of Surgeons of the Ghana College of Physicians and Surgeons.

The notice has come about because the tenure of Office of the President and Vice Presidents of the Divisions will come to an end in December 2018.

The President of the College shall be a Fellow in good standing and shall be nominated and voted for by **ALL** Fellows of the College.

The Candidate for the position of President shall be nominated by three (3) Fellows of the College.

The Vice President of a Division shall be a Fellow of that Division in good standing; and shall be nominated and voted for by Fellows of the Division only.

The Candidate for the position of Vice President shall be nominated by three (3) Fellows of the Division in good standing.

The nominee for **ALL** positions shall endorse the nomination.

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1. Academic Head of the College
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3. Member of the Governing Council of the College
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The Vice President of a Division is:

1. Head of the Division
2. Chairperson of the Divisional Board
3. Member of the Academic Board
4. Member of the Governing Council of the College

The closing date of receipt of nominations is **Wednesday 31st October, 2018.**

The nomination form which is attached should be submitted to **The Chief Administrative Assistant, Office of the Rector, Ghana College of Physicians and Surgeons, P.O. Box MB 429, Accra** with the following:

a. A biographical sketch of not more than 150 words
b. A Mission Statement of not more than 150 words and
c. One recent passport size photograph

Professor Jacob-Plange-Rhule
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Theme: *"Putting the 'Heart' Back into Healthcare: Quality Management and Ethical Practice"*

Date: Monday 10th – Friday 14th December 2018

Venue: Ghana College of Physicians and Surgeons, Ridge, Accra

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Pre-conference sessions comprising symposia, seminars and workshops of interest to particular Faculties and Specialties will be held on Monday 10th and Tuesday 11th December 2018.

Interested medical/dental practitioners, nurses and others who may wish to attend any of the programs should call 0302 238650/238703/024 3690073: or call personally at the College for registration or further enquiries. Registration Fees: GHS 100.00 per day.

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Wednesday 12th December 2018		**Thursday 13th December 2018**	
8.30am	Opening Ceremony	8.00am	Faculty Meetings
10.20am	College Lecture	10.30am	Plenary Session
11.30am	Induction of Newly Qualified Members and Newly Qualified Fellows	1.30pm 3.30pm	Scientific Session I Scientific Session II
1.00pm	Faculty Board Meetings		
7.00pm	Annual College Dinner		
Friday 14th December 2018 8.30am Divisional Board Meetings 10.00am Fitness to Practice Seminar 11.00am Business Meeting for Members and Fellows			

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2. All authors have read and approved the final draft.
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Book
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Book Chapter
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