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Research Article

Endocrine Admissions in a Tertiary Hospital In Nigeria: A 5-Year Review of Pattern and Trend

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ABSTRACT

Hospital admission is a reflection of prevailing disease pattern in an environment, impact of services rendered in the outpatient department and preventative healthcare services in the community. The aim of this study was to determine the pattern and trend of endocrine related admissions at Ekiti State University Teaching Hospital, Ado-Ekiti. This was a retrospective analysis of health records of patients with endocrine related disorders admitted into the medical wards of the hospital between 2008-2012. The diagnoses, based on WHO ICD-10 were documented. Endocrine related admissions were subdivided into diabetes related, thyroid related and non-diabetes hypoglycaemia. Data of interest were compared with Pearson's Chi-Square and Student's t test. There were 3818 admissions out of which 457 (12.0%) were endocrine related. Majority of the endocrine admission were DM related (93.9%), representing 11.8% of the total admissions. There was increase in endocrine-related admissions from 9.1%-18.0% and a 10.6% increase in the DM related admissions from 2008 to 2012, but a decline in absolute number of endocrine admissions notably among females ($X^2 = 39.88, p < 0.001$). Poor glucose control (42.8%) was the commonest reason for diabetic admission, followed by hyperglycaemic emergencies (31.1%), diabetic foot disease (15.9%), sepsis (2.6%), stroke (2.3%), nephropathy/renal failure (1.6%), diabetic hand (0.9%), hypoglycaemia (0.9%), heart failure (0.7%). Between 2010-2012, hyperglycaemic crisis emerged as the commonest reason for diabetic admission, but overall, there was significant reduction in the number of hospitalizations for all diabetic complications ($X^2 = 128.69, df = 36, p = 0.000$). More resources need to be allocated for the management of diabetes mellitus while efforts to prevent its complications through educational activities and public awareness should be sustained.

Keywords: Endocrine, diabetes mellitus, admission, complications, trend

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INTRODUCTION

Hospital admission is a reflection of prevailing disease pattern in an environment, impact of services rendered in the outpatient department and preventative healthcare services in the community (Whitfield, 2006). Knowledge of pattern of admissions will provide the basis for evidence-based recommendations, health planning and appropriate allocation of health resources, and improve quality of care. The clinical audit is essential as a valuable tool and should be performed regularly to detect changing trends in admission pattern and disease epidemiology.

Endocrine diseases, notably diabetes mellitus (DM) is on the increase worldwide, and Nigeria is not spared. Globally, the prevalence of DM is estimated or projected to increase from 451 million in 2017 to 693 million by 2045 (Cho *et al.*, 2018). Similarly, DM in Nigeria increased from 2.2% in 1992 to 5.8% in 2016 (Adeloye *et al.*, 2017). This implies that the

contribution of endocrine diseases to morbidity and mortality in Nigeria is expected to increase. In Nigeria, endocrine admissions increased from 10% in 2000 to 18.5% (mostly diabetes) in 2008 (Ogun *et al.*, 2000, Unachukwu *et al.*, 2008). Previous reports from another tertiary institution in Ekiti, Nigeria, revealed that diabetes-related diseases accounted for 4.4% of medical ward admissions (Ajayi and Ajayi, 2009). A similar rising trend was observed in Addis Ababa, Ethiopia (Melaku *et al.*, 2006). In the above and other studies, hospitalizations were mostly due to hyperglycaemic emergencies, diabetes foot ulcer, and poorly controlled blood (Ajayi and Ajayi, 2009), (Melaku *et al.*, 2006), (Bateganya *et al.*, 2003). However, it is expected that with improvement in the care of people with endocrine diseases, in particular, DM care, a reduction in the frequency of admissions can be achieved. This is because these complications are preventable (Kearney and Dang, 2007). Since the establishment of Ekiti

State University Teaching Hospital (EKSUTH) in 2008 and appointment of specialist clinicians, the hospital had witnessed remarkable improvement in the care of patients with endocrine diseases.

Previous studies at our institution focused on medical and cardiology admissions (Adeoti, 2015) (Ajayi, 2014). To date, there has been no research about the pattern and trend of endocrine admissions in the hospital, thus necessitating this study. We hypothesize that despite the rising prevalence of DM, the improved care will result in decline in endocrine admissions. The aim of this study was to determine the pattern and trend of endocrine-related admissions, especially diabetes mellitus, over 5 years in Ekiti State University Teaching Hospital, Ado-Ekiti. This will help to make appropriate recommendations to the policymakers and formulate appropriate guidelines to reduce endocrine related morbidity and admission rate.

MATERIALS AND METHODS

Study design: Cross-sectional descriptive study of endocrine medical admissions

Setting: Medical wards of Ekiti State University Teaching Hospital (EKSUTH). The institution became a teaching hospital in 2008 while endocrine specialist clinic was established in 2010. The hospital serves as a referral centre for Ekiti and neighbouring states, including Kogi, Kwara, Ondo and Osun. Patients are usually admitted into the medical wards from the accident and emergency unit of the hospital, and occasionally, through the medical outpatient department.

Methods: This was a retrospective analysis of health records of patients with endocrine-related disorders admitted to the medical wards of the hospital over five years (2008-2012). Relevant demographic parameters such as age and sex were documented. The diagnoses, based on WHO International Classification of Diseases, 10th Revision (ICD-10) were documented. Endocrine-related admissions were subdivided into DM-related, thyroid-related and non-diabetes hypoglycaemia. Diabetes mellitus related admissions were further categorized into hyperglycaemic emergencies, diabetic foot disease, diabetic hand infection, stroke, heart disease/failure, nephropathy/renal failure, sepsis, hypoglycaemia, and admissions due to poor glucose control.

Data handling: The collected data were analyzed using SPSS version 21. Means of the continuous variable were compared

with Student's t-test, while percentages were compared with Pearson's Chi-Square. Significant statistics was set at 2-tailed $p < 0.05$.

RESULTS

There were 3818 admissions during the study period out of which 457 (12.0%) were endocrine-related with male patients having greater proportion, 242 (53.0%). The mean age of the patients was 54.0 ± 17.3 years with no difference between the men compared to the women. Majority of the endocrine admission were DM-related (93.9%), representing 11.8% (449/3818) of the total admissions (Table 1).

There was a gradual but remarkable increase in endocrine-related admissions from 9.1% in 2008 to 12.3% in 2009, 15.0% in 2011, and 18.0% in 2012. However, we observed a marginal decline in the male endocrine admission in 2010 compared to the female pattern in contrast to what was observed in the year 2012 where male admission pattern predominates. Overall, there was a significant decline in the absolute number of endocrine admissions notably among females from 2008 to 2012, ($X^2 = 39.88, P < 0.001$) (Table 2).

Figure 1 shows the yearly analysis of endocrine admissions. We observed a 10.6% decline in the DM-related admissions between 2008 and 2012. As shown in Figure 2, almost half of the patients with DM were admitted due to poor glycaemic control (42.8%) followed by hyperglycaemic emergencies, and diabetic foot disease. Very few patients with DM were admitted on account of sepsis and stroke. Other reasons for DM-related admissions were nephropathy/renal failure, hand infection, hypoglycaemia, and heart failure.

Table 1:
Age and sex distribution of endocrine admissions

	Male (n=242)	Female (n=215)	Both sexes	P
Mean age (years)	54.0 ± 17.3	56.3 ± 14.3	55.1 ± 15.9	0.134
Diagnosis				
Diabetes related n (%)	229 (94.6)	200 (93.0)	429 (93.9)	0.504
Thyroid related n (%)	1 (0.4)	3 (1.4)	4(0.9)	
Non-diabetes related hypoglycaemia n (%)	12 (5.0)	12 (5.6)	24(5.3)	

Table 2:
Total and endocrine admissions according to gender and year

Admissions	2008			2009			2010			2011			2012		
	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both
All Medical	660	800	1460	389	406	795	290	308	516	351	308	659	326	62	388
Endocrine	58	75	133	46	52	98	27	30	57	50	49	99	61	9	70
% of medical admissions	8.79	9.38	9.11	11.83	12.81	12.33	9.31	13.27	11.05	14.25	15.91	15.02	18.71	14.52	18.04

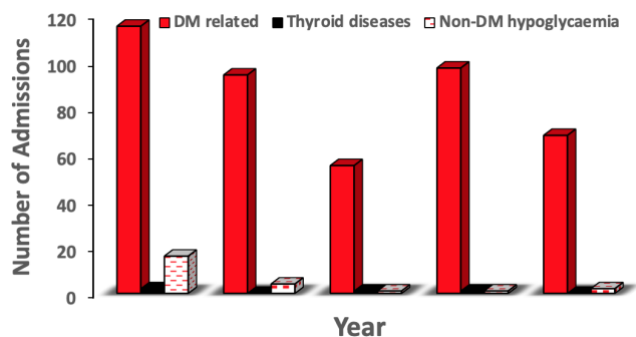


Figure 1
Endocrine admissions by year
 $X^2= 21.09$, $df=8$, $p=0.007$

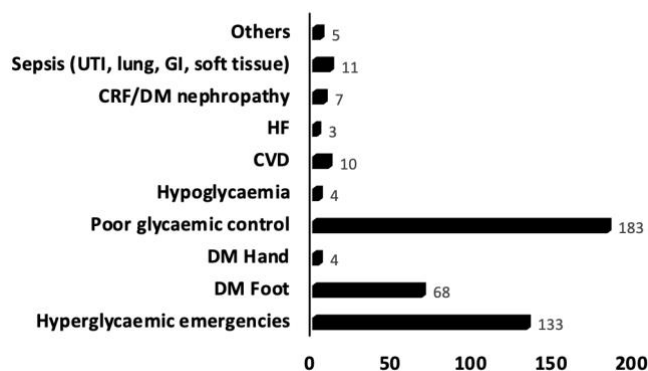


Figure 2:
Pattern of diabetes related admissions

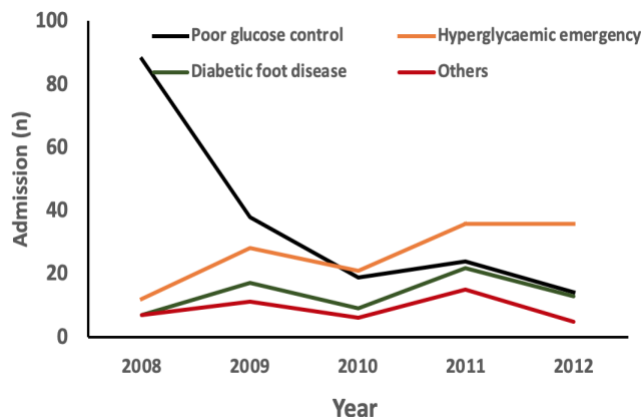


Figure 3:
Trends in diabetic admissions for both men and women over five years
 $X^2 = 128.69$, $df= 36$, $p<0.001$

Figure 3 shows the trends in diabetic admissions over five years. Hospitalization for glycaemic control declined from 2008 to 2012. In the last three years under review, hyperglycaemic crisis emerged as the commonest reason for diabetic admission, followed by poor glycaemic control and diabetic foot disease. Overall, there was a significant reduction in the number of hospitalizations for all diabetic complications ($X^2 = 128.69$, $df= 36$, $p=0.000$).

DISCUSSION

Our study focused on pattern and trend of endocrine admissions at Ekiti State University Teaching Hospital over a five-year period. In tandem with nutritional transition, non-communicable diseases have emerged as an important or significant contributor to morbidity in Nigeria. Globally, the prevalence of diabetes mellitus is rising at alarming rate, and Nigeria is not spared of the scourge (Cho *et al.*, 2018). Thus, endocrine diseases (in particular diabetes) are frequently encountered in the medical wards of referral hospitals in Nigeria. Studying the pattern and trend of endocrine disease will provide evidenced- based information that may translate into improved health planning and care.

More men than women were admitted for endocrine diseases but it was not statistically significant. Studies from Abeokuta and Enugu located in the south-western and south-eastern regions of Nigeria respectively also revealed male preponderance for medical admissions, out of which endocrine admissions were significant (Ogah *et al.*, 2012 and Ezeala-Adikaibe *et al.*, 2014). Women often to seek medical attention earlier at the outpatient department, while men have the tendency to wait until the disease is advanced, requiring emergency care. Unpublished observation/data from our centre showed that more women attend the endocrinology and diabetes clinic. However, in a study from Lagos and Ghana, female preponderance was reported for endocrine admissions (Anyanwu *et al.*, 2013 and (Sarfo-Kantanka *et al.*, 2016)).

Endocrine admissions constitute 12.0% of the total admissions into the medical ward. This is higher than 8.1% reported by Ogah *et al.* (Ogah *et al.*, 2012), and 10% by Ogun *et al.* (Ogun *et al.*, 2000), both in Ogun State, Nigeria, but lower than 18.5% reported by Unachukwu *et al.* in Port Harcourt, Nigeria (Unachukwu *et al.*, 2008). The study by Ogun *et al* was done earlier, reflecting the increasing prevalence of diabetes. Similarly, a report beyond the time of our review showed high prevalence of 19.1% (Ezeala-Adikaibe *et al.*, 2014). Even though Unachukwu *et al.*, reported their study earlier, it was conducted at a location known for high prevalence of diabetes mellitus, which constitute the major bulk of the endocrine disease documented in their study (Adeloye *et al.*, 2017).

Diabetes-related admissions accounted for 93.9% of the endocrine admission, and this translates to 11.24% of the total admissions. Other hospitalizations were due to hypoglycaemia not related to DM (5.3%) and thyroid diseases (0.9%). In the report by Ogah *et al*, diabetes mellitus accounted for 97.9% of all endocrine admissions while thyrotoxicosis was responsible for the others (Ogah, 2012). Other workers from Port-Harcourt, Nigeria; Addis Ababa, Ethiopia and Kumasi, Ghana also reported higher preponderance of DM among patients admitted for endocrine diseases (Unachukwu *et al.*, 2008 and Adem *et al.*, 2011, Sarfo-Kantanka *et al.*, 2020). This is the global trend, and is not surprising since it is the commonest endocrine disease usually encountered in the outpatient department, and is a reflection of the rising prevalence of DM in our community (Adem *et al.*, 2011). In addition to DM and thyroid disease, Cushing’s syndrome was reported in a study done in Ethiopia (Adem *et al.*, 2011).

As stated above, diabetes was responsible for 11.24% of the total admission. Other researchers reported a prevalence of between 4.2% to 19.1% in Uganda (Bateganya *et al.*, 2003), Nigeria (Ajayi and Ajayi, 2009; Ezeala-Adikaibe *et al.*, 2014), Sudan, (Noor *et al.*, 2015) and Ethiopia (Melaku *et al.*, 2006), depending on the location and time of the study. Nigeria, being the country with the highest burden of diabetes in Africa, had the highest prevalence, and expectedly, more recent studies reported higher prevalence.

Analysis of diabetic admissions showed that poor glucose control topped the reasons for hospitalization, followed by hyperglycaemic emergencies in about a third, and diabetic foot ulcer; and together, these accounted for about 90% of the admissions. Those with poor glucose control included people who were diagnosed for the first time. It is not uncommon for people to be diagnosed with DM, with or without complications for the first time in the emergency room (Bateganya *et al.*, 2003 and Ekpebegh *et al.*, 2010). Similar to our findings, most studies reported that hyperglycaemic emergencies and poor glucose control, accounted for the majority of diabetes admissions (Melaku *et al.*, 2006, Bateganya *et al.*, 2003, Ogah *et al.*, 2012, Anyanwu *et al.*, 2013, Adem *et al.*, 2011, Noor *et al.*, 2015 and Sarfo-Kantanka *et al.*, 2016). Both conditions may represent the end of a continuum, since most patients will have poor glucose control before ending up in emergencies, the presenting feature being determined by how early they come to the hospital, with late presenters having emergencies.

Diabetes foot ulcer accounted for only 15.9% of our diabetic admission, and was reported to be the cause in 4.2% -19% by other workers (Bateganya *et al.*, 2003, Anyanwu *et al.*, 2013, and Adem *et al.*, 2011). This rate is significant considering the enormous morbidity and mortality associated with the disease (Jeyaraman *et al.*, 2019). However, in a study carried out at Ido-Ekiti, Nigeria on admission pattern of diabetes-related diseases, Ajayi *et al.*, reported diabetes foot ulcer as the commonest reason for hospitalization, followed by hypertension, poor glucose control, diabetic emergencies, and stroke (Ajayi and Ajayi, 2009). Diabetic foot ulcer is preventable, but continues to be a significant cause of morbidity among patients with diabetes in Nigeria. It is hoped that aggressive patient education will halt this undesirable trend in future.

Sepsis contributed to 2.6% of hospitalizations in our study. Some workers, however, reported higher rates of 27.7-36.3% (Bateganya *et al.*, 2003, and Adem *et al.*, 2011). These reports included patients with tuberculosis, HIV/AIDS, malaria, and foot ulcer that we categorized separately. Diabetes mellitus is associated with immune suppression and this predisposes its sufferers to infections.

Microvascular and macrovascular complications of DM (renal/heart/stroke) contributed to about 5% of admission in our study. Anyanwu *et al* reported that 19.0% of their patients had DM related co-morbidities. The disparity between their report and ours may be due to methodological differences. For, example their patient population were those that presented to the emergency room only. It is recognized that some patients may be discharged, die or leave the hospital against medical advice in the emergency room (Onwuchekwa *et al.*, 2008). Other workers who also reported higher

prevalence of DM related co-morbidities (50.7%) opined that they were not necessarily the cause of admissions in their patients (Bateganya *et al.*, 2003).

We found that hypoglycaemia contributed less to cases of diabetic admission similar to other reports (Bateganya *et al.*, 2003 and Adem *et al.*, 2011). This may be a reflection of outpatient preventative educational activities. On the other hand, since hypoglycaemia is easily reversible, it is possible that most patients with hypoglycaemia were discharged from emergency room soon after recovery. Tropical diabetic hand infection was the cause of admission in 0.9% of our patients. None of the researchers cited above reported this complication. Even though it is not as common as diabetic foot ulcer, it does occur, and cases/case series have been reported by us and other workers (Ezeani and Edo, 2014).

There was a serial and yearly increment of endocrine admission from 9.11% in 2008 to 12.33% in 2009, 15.0% in 2011, and 18.04% in 2012. This finding reflects the rising burden of DM in the country (Adeloye *et al.*, 2017). It is also consistent with previous reports from other countries (Melaku *et al.*, 2006, Adem *et al.*, 2011 and Sarfo-Kantanka *et al.*, 2016). A study on the trend of diabetic admissions in Ethiopia revealed a serial increment from 7.1% to 34.1% over a four-year period (Adem *et al.*, 2011). A Ghanaian study demonstrated greater than 600% rise in diabetes admission over about three decades (Sarfo-Kantanka *et al.*, 2016). There is dearth of Nigerian studies which focus on trend in diabetic endocrine/diabetic admissions, but one can extrapolate a rising trend by comparing reported rates from earlier and current studies in the country.

We observed a steady increase in endocrine admissions for male patients from 2010 to 2012. The increment was seen in both the absolute number and percentage of male patients admitted. On the contrary among females, there was a significant decline in the absolute number of admissions from 2008-2012, but only a little decline in the percentage of endocrine hospitalizations from 2011 to 2012, thus partly confirming our hypothesis. Although gender disparity in diabetic complications have been observed, (Maric-Bilkan, 2017), the differences observed in our study may be because female patients access outpatient services more than males, resulting in fewer complications. In addition, this may be related to the health seeking behaviours of men compared with women. In our society, men as the breadwinner of the family, may not have or spare time to visit the hospital until the condition worsens, necessitating emergency room visit.

Hospitalization for glycaemic control declined from 2008 to 2012. This may suggest that glycaemic control has improved over time since the commencement of specialist endocrine clinic in our hospital. As part of the routine clinic activities, patients are educated about their disease condition, the need for medication adherence to ensure good glycaemic control, and prevention of complications. It may also imply that more people are getting tested and diagnosed during health outreaches or in response to public education and awareness obviating the attendant risk of complications associated with DM.

Hyperglycaemic emergencies and diabetic foot disease continued to be important reasons for admissions since the hospital was transformed from a secondary care level to a

teaching hospital in the five year under review. However, many of these patients may have presented for the first time with these (diabetic) complications. A recent systematic review and meta-analysis confirmed that these two complications accounted for most diabetic related hospitalizations over the decades (Adeloye *et al.*, 2017). Our hospital being a referral centre, patients with hyperglycaemic emergencies are frequently encountered, and admitted from the emergency room. A morbidity and mortality report in United States of America also revealed a rise in hospitalizations for DKA between 2009 and 2014, following an initial decline in the previous years (Benoit, 2018). Updating the knowledge of primary care physicians in the identification and prompt management of hyperglycaemic emergencies may curb this trend in resource-constrained settings like ours. It has been shown that when guidelines are followed, the outcome of hyperglycaemic emergencies improved (Nyenwe and Kitabchi, 2011, Waller *et al.*, 2007). Among people with DM, admissions for hypoglycaemia also declined during the five years under review. Early recognition of hypoglycaemia and its management forms part of the educational activities in our outpatient clinic.

Although this study may not have convincingly confirmed our hypothesis, it has nevertheless shown some disparity in admission trend of male and female patients with diabetes mellitus. It is necessary to properly elucidate reasons for these differences in future research. Additionally, the study is limited by failure to differentiate existing from new patients. Future studies should separate those who have been coming to the hospital and new timers to accurately assess the impact of the specialist services.

In conclusion, Diabetes-related conditions remain the most common causes of hospitalizations in this five-year study conducted in a tertiary-level healthcare facility in Ekiti State, Nigeria. Hyperglycaemic emergencies and diabetic foot disease have emerged as the most common reason for admission. More resources need to be allocated for the management of diabetes mellitus while efforts to prevent its complications through educational activities and public awareness should be sustained.

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