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Pattern of Antidiabetic Drugs Use in a Diabetic Outpatient Clinic of a Tertiary Health Institution in Sokoto, North-western Nigeria

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To study the pattern of drug prescription among diabetic patients attending the endocrinology clinic of a tertiary health centre in Nigeria with the aim of evaluating the degree of physicians' compliance to current evidence and clinical guidelines. This is a descriptive cross sectional study using case notes for 469 patients with mean age of 46.5±12.5 years and male: female ratio of 1:1.5. Information of interest including demographic details, indication for drug use, concurrent illness and medications prescribed including dosages were extracted using a pre piloted data collection form. Majority of the patients (90.3%) had type 2 diabetes. The percentages of patients on antidiabetic monotherapy and combination therapy were 24.8 and 75.2, respectively. Of the 348 patients on antidiabetic combination therapy, 293 (84.2%) and 55 (15.8%) were on 2 and 3 drugs, respectively. Overall, metformin was the most frequently prescribed antidiabetic agent (81.9%). However, as monotherapy, metformin was overtaken by insulin as the most frequently utilized (32.2% for insulin versus 29.6% for metformin). Hypertension was the most frequent comorbid condition (43.9%) observed in the study and antihypertensive agents, particularly angiotensin converting enzyme inhibitors (the most commonly prescribed antihypertensive agent) was found to be the most frequently utilized non-antidiabetic drugs. About 38% of the patients having both diabetes and hypertension were on Angiotensin Converting Enzyme Inhibitor (ACEI) /Angiotensin Receptor Blocker (ARB) monotherapy. This study revealed that the pattern of antidiabetic prescription was rational and largely compliant with clinical guidelines. However, antihypertensive agents were found to be underutilized for managing patients with both diabetes and hypertension.

Key words: Antidiabetic agents, drug use pattern, sokoto-Nigeria

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INTRODUCTION

Diabetes is a common and very prevalent disease affecting the citizens of both developed and developing countries and is the most common endocrine disorder globally (Afolayan and Sunmonu, 2010). The number of people developing diabetic mellitus is currently increasing worldwide in alarming exponential proportions, this may not be unconnected to rapid rise in unhealthy life styles, urbanisation and aging (Wild *et al.*, 2004). There is an estimate of over 200 million people with diabetes in the world, 80% of whom reside in developing countries (Mohan and Pradeepa, 2009). It affects about 16 million people in the United States (Wadkar *et al.*, 2008) and is expected to be the most prevalent non-communicable disease by 2025 (Wild *et al.*, 2004). Available data suggest that diabetes is emerging as a major health problem in Africa, including Nigeria (Mbanya *et al.*, 1996). Concurrent illness such as hypertension in diabetics makes it more difficult to avoid multiple drug use, hence diabetics are more prone to polypharmacy and sometimes to irrational prescriptions (Upadhyay *et al.*, 2007). There is paucity of data regarding drug use pattern in diabetes in Nigeria. Drug utilisation study of antidiabetic agents is of paramount importance to promote rational drug use in diabetics and make available valuable information for the healthcare team. This study is therefore aimed at determining the pattern of drug prescription among diabetic patients so as to evaluate the degree of physicians' compliance to current evidence and clinical guidelines, analyse the prescription according to some prescribing indicators, calculating the mean prescription cost and to review the prescriptions as per drug combinations with the aim of documenting any possible drug-drug interaction.

MATERIALS AND METHODS

This study is a descriptive cross sectional study conducted in the endocrinology unit of the medical outpatient department, Usmanu Danfodiyo University Teaching Hospital, Sokoto, north-western Nigeria. Hospital records of diabetic patients seen at the endocrinology outpatient clinic of the hospital during the period covering January to June 2011 were collected and examined. The records of all diabetic patients who were on antidiabetic agent(s) was isolated, screened and relevant data extracted. All records with incomplete information and records of patients managed primarily for ailments other than diabetes were excluded.

Using a pre piloted data collection form, information on the demographic details, diagnosis, duration of illness,

co-morbidity and the medications prescribed with dosage and duration were documented. Analysis of the data was performed using the graph pad instat statistical software.

RESULTS

Case notes for 469 patients with mean age of 46.5±12.5 years and male: female ratio of 1:1.5 was used. Of the 469 patients studied, 402 (85.7%) belong to Hausa/Fulani ethnic group (Table 1) and 249 (53.1%) were unemployed housewives (Table 2). Majority of the patients (90.0%) had type 2 diabetes (Table 3).

The pattern of antidiabetic drug utilization is shown in Table 5 and 6. A total of 1530 drugs were prescribed in all, on the average, the number of drugs prescribed daily for each patient is 3.3. Of the 469 patients studied, 463 (98.7%) were placed on drug treatment of diabetes, with only 6 (1.3%) being on life style management. The percentages of patients on antidiabetic monotherapy and combination therapy were 24.8 and 75.2, respectively. Of the 348 patients on antidiabetic combination therapy, 293 (84.2%) and 55(15.8%) were on 2 and 3 drugs, respectively. Overall, metformin was the most frequently prescribed antidiabetic agent (81.9%). However, as monotherapy, metformin was overtaken by insulin as the most frequently utilized (32.2% for insulin versus 29.6% for metformin). Hypertension was the most frequent comorbid condition (43.9%) observed in the study (Table 4) and antihypertensive agents, particularly angiotensin converting enzyme inhibitors (the most commonly prescribed antihypertensive agent) was found to be the most frequently utilized non-antidiabetic drugs

Table 1: Ethnicity distribution

Tribe	Frequency (%)
Hausa/Fulani	402 (85.7)
Yoruba	21 (4.5)
Igbo	27 (5.8)
*Others	19 (4.0)

*Others include minority tribes; Chiko, Dakarkari, Igala, Tiv. N = 469

Table 2: Distribution of occupation

Occupation	Frequency (%)
House wives	249 (53.1)
Civil Servants	114 (24.3)
Business Men	75 (16.0)
Students	18 (3.8)
Farmers	13 (2.8)

N = 469

Table 3: Distribution of indication for antidiabetic use

Diagnosis	Frequency (%)
Type II DM	422 (90.0)
Type I DM	35 (7.5)
Gestational DM	12 (2.5)

N = 469

Table 4: Distribution of concurrent illness

Co-morbidity	Frequency (%)
Hypertension	204 (43.9)
Thyroid Disease	15 (3.2)
PUD	13 (2.8)
UTI	12 (2.6)
Malaria	12 (2.6)
Osteoarthritis	9 (1.9)
Gastroenteritis	9 (1.9)
Pneumonia	7 (1.5)
Infertility	6 (1.3)
Stroke	8 (1.7)
Cervical Spondylosis	3 (0.7)
Chronic Pancreatitis	3 (0.7)
Obesity	3 (0.7)
PTB	3 (0.7)
RVD	3 (0.7)

N = 310

Table 5: Classification of medications

Drug classes	Frequency (%)
Antidiabetics	824 (53.9)
Antihypertensives	404 (26.4)
Antibiotics	40 (2.6)
Antipsychotics	51 (3.3)
Analgesics	91 (6.0)
Multivitamins	48 (3.1)
Antihyperlipidemics	6 (0.4)
Antimalarials	9 (0.6)
Antithyroid	9 (0.6)
Antiulcer	21 (1.4)
Others	27 (1.7)

N = 1530

Table 6: Distribution of antidiabetic combinations

Combination(s)	Frequency (%)
Metformin+Glibenclamide	267 (76.7)
Metformin+Glibenclamide+Pioglitazone	37 (10.6)
Metformin+Glibenclamide+Insulin	18 (5.2)
Metformin+Pioglitazone	13 (3.7)
Metformin+Insulin	3 (0.9)
Metformin+Gliclazide	7 (2.0)
Pioglitazone+Glibenclamide	3 (0.9)

N = 348

(Table 6). Of the 204 patients having both diabetes and hypertension, 78 (38.2%) were found to be on either ACEI or ARB monotherapy. Furthermore, out of the total 463 prescriptions examined, 241 (52.1%) may potentially result in drug-drug interactions. The average cost per prescription was Nigerian Naira N 2168.64 (US \$14.46). Antibiotics prescribed were only 2.6%, while injections were 32.2% in this study.

DISCUSSION

This study revealed a high incidence of diabetes in the age group 41-50 years. The mean±SD age of patients in this study was 46.5±12.5 years, a finding similar to that obtained from studies in Nigeria (48.99±9.2 years) (Nyenwe *et al.*, 2003), but in contrast with the mean age in studies from India (56.9±12.55 years) (Upadhyay *et al.*, 2007), Spain (60.5±12.8 years)

(De Pablos-Velasco *et al.*, 2005) and Netherlands (67 years) (Van den Brink *et al.*, 1993). Advancing age is a risk factor for diabetes and the prevalence of diabetes increase with age (Zimmet, 1982), however it has been documented that the peak incidence of diabetes in Nigeria was after 45-50 years of age (Johnson, 1971).

A high proportion of diabetic patients in this study were represented by females. This is in agreement with other reports from Nigeria (Enwere *et al.*, 2006; Adibe *et al.*, 2009). In Nigeria, higher prevalence of obesity and insulin resistance, two risk factors for developing type 2 diabetes mellitus, have been reported among females (Ezenwaka *et al.*, 1997). However, our study setting is a public health centre and it has been documented that such institutions, unlike private sectors, are poorly attended by male patients (Adams and Carter, 2011), thus this factor may serve as another possible explanation for the high proportion of females attending the clinic. Also, the current study revealed a high rate of prescription of antidiabetic combination regimen (75.2%), a finding consistent with recent trend for advocating initial combination therapy for type 2 diabetes mellitus (Zinman, 2011). The ratio of drugs prescribed per patient is 3.3, a figure slightly higher than the value of 2.6 reported by Adibe *et al.* (2009) but lower than 4 obtained by Bnouham *et al.* (2006) from similar settings in South-eastern and south-western Nigeria, respectively. Such a high ratio is not surprising since it has been documented that diabetic patients utilize more drugs than other patients (Good, 2002). About 90.3% of the patients studied have been diagnosed of type 2 diabetes. This finding agrees with results from other studies in Nigeria and worldwide (Johnson *et al.*, 2001; Adibe *et al.*, 2009). The fact that metformin was the most prescribed drug complies with its endorsement as the preferred antidiabetic agent by current clinical guidelines (IDF, 2005; CDA, 2008; NIHCE, 2010; Nathan *et al.*, 2006). The proportion of diabetic patients found to have comorbid hypertension is high which is not surprising since it reflects what obtains globally. The high rate of prescription of ACEI observed in the study is consistent with its documented benefit in preventing diabetic nephropathy (Ontarget Investigators *et al.*, 2008). However, the fact that more than one third of the patients having both diabetes and hypertension were on ACEI or ARB monotherapy is not in line with current evidence (UK Prospective Diabetes Study Group, 1998; Whelton *et al.*, 2005) that demonstrated the benefits of more strict control of blood pressure in such category of patients (below 130/80), since studies have shown that, ACEI/ARB monotherapy are not effective in black hypertensives (GCNHS, 2005). Although over 50% of the

prescriptions examined may potentially result in drug-drug interactions, none has the potential of causing serious interactions. They include concurrent administration of glibenclamide with ciprofloxacin as well as the use of glibenclamide or metformin with either hydrochlorothiazide, prednisolone, ACEI (enalapril or lisinopril) or ARB (losartan).

CONCLUSION

Overall, the pattern of prescription for diabetic patients in the clinic under study is rational and, to a great extent, compliant with current evidence and clinical guidelines. However, this study found an apparent underutilization of antihypertensives for diabetic patients having co-morbid hypertension, indicating the need for continuing medical education for physicians and closer collaboration between endocrinology and cardiology clinics in managing such category of patients. Inability to determine the blood sugar controls as well as its retrospective nature are some of the limitations of this study.

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