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ASSESSMENT OF DRUG THERAPY PROBLEMS IN PATIENTS WITH DIABETES `MELITUS TYPE II IN A NIGERIAN TERTIARY HOSPITAL

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ABSTRACT

Introduction: Diabetes mellitus is a growing metabolic disorder among the general adult population largely driven by obesity, physical inactivity, dietary indiscretions and socioeconomic factors. Conservative estimates from international diabetic federation showed that about 8.3% of global population is living with the disease. The treatment of diabetes requires drug therapy that frequently produces problems. Identification, detection and resolving actual and potential drug therapy problems is key to improving treatment outcomes and quality of life of patients as well as prevent unnecessary deaths. **Objectives:** To determine prevalence of drug therapy problems. Determine the appropriateness of medications and compare the incidence of drug therapy problems between male and females. **Methods**: The study was carried out in the outpatient department of federal medical centre Keffi. This prospective study involved patients receiving treatment for type 2 diabetes mellitus. Records of medication prescribed during the study period were reviewed for the presence of actual or potential drug therapy problems using Beers criteria and medication appropriateness index. **Results And Discussion:** Demographic data showed that mean age was 57.5±10.5 years. Dyslipidaemia (73.8%) and hypertension (52.7%) were the leading comorbidities found among the patients. Metformin and Metformin combination drugs were the most prescribed accounting for 66.7%. The preference for Metformin is largely due to its beneficial effects on the cardiovascular system as well as its inherent weight

neutral property. Overall prevalence of drug therapy problems was 31.2% of which 41.2% fall under drug interactions with while drug reactions accounted for 18.7%. Prevalence of drug therapy problems varies widely in published studies due to differences in study settings, classification system and assessment tools. **Conclusion**: The most encountered drug therapy problems were drug interactions and drug reactions and their prevalence is high. There is no significant difference in prevalence of drug therapy problems in males and females.

KEYWORDS: Diabetes mellitus, Comorbidities, Drug therapy.

INTRODUCTION

Diabetes mellitus type 2 is a growing metabolic disorder among general adult population worldwide. An estimate of prevalence of 2.8% of global adult population is projected to reach 4.4% in the next three decades. Based on the current trends and conservative predictions, the number of people living with type II diabetes mellitus is expected to rise from 171 million to about 366 million by 2030.[1]

International diabetes federation however estimated that as at 2011 about 366 million adults between ages 20 – 79 are already living with the disease representing a comparative global prevalence of 8.3%.[2] Africa has been estimated to have the highest prevalence of undiagnosed diabetes and estimates of up to 80% have been projected. In Nigeria however, local prevalence studies have reported diabetes prevalence ranging from 5.5%[3] to as high as 21.1%.[4]

Diabetes mellitus is a group of metabolic disorders largely characterized by hyperglyceamia due to impaired insulin secretion with or without insulin resistance. It often associated with multiple organ dysfunctions affecting mostly the eyes, nerves, vascular and renal systems. In contrast to type I diabetes mellitus, type II is most prevalent in adults above forty years of age and it's often accompanied by obesity, physical inactivity as well as environmental and social factors. The aetiology is primarily a combination of insulin resistance and inadequate compensatory insulin secretory response.

In type II diabetes mellitus, a high degree of hyperglyceamia sufficient to cause functional changes in various organs may exist for a long period of time without symptoms.[5] Complications may arise due to natural progression or secondary diseases from impact on organs and tissues. Macrovascular complications such as coronary heart diseases, strokes,

peripheral vascular diseases risk is 2 – 4 times higher in diabetics.[6] Microvascular complications like retinopathy, nephropathy and peripheral neuropathy are the most common among diabetics for which retinopathy accounts for over ten thousand cases of blindness in the USA.[7]

Management of diabetes is generally involves a combination of dietary and lifestyle changes alone or in conjunction with pharmacotherapy to normalize glyceamic level. Drug therapy is a key component of diabetes management and despite its proven benefits in preventing complications and improving the quality of life of patients, several problems arise with pharmacotherapy. These drug therapy problems are often associated with increased morbidity, hospitalization, cost of medical care[8] and some cases mortality.[9]

Identification and resolving drug therapy problems is the cornerstone of pharmaceutical care for patients. Millions of patients experience problems with their medications[10] annually and medication errors is reported to cause 204,000 deaths at an economic cost of $14 billion.[11] Drug therapy problems regularly occur along the whole spectrum of medication use process, and with polypharmacy being inevitable in diabetes treatment, the potential for drug related problems is high. It's imperative that potential and actual drug therapy problems are identified and resolved in order to achieve positive outcomes of drug therapy.

OBJECTIVES

- To determine the prevalence of actual and potential drug therapy problems
- To determine the appropriateness of medications
- To compare incidence of drug therapy problems between males and females.

METHOD

Background: Federal medical center Keffi is a 200 bed tertiary hospital located about 50km east of the federal capital territory Abuja. The hospital offers specialized medical services in gyneacology, ophthalmology, endocrinology and cardiovascular diseases. This study was carried out in the outpatient department of the hospital.

Study design: This is a prospective study involving patients that have been receiving care for established diabetes mellitus type II. Patients who participated in this study were identified from medical records and their prescriptions followed up throughout the duration of the study which took place between January and December 2014.

Sample size: This was calculated by using Andrew Fishers method for determining sample size for infinite populations. A sample size of 400 was selected using simple random sampling.

Data collection: Drug prescriptions for the patients were reviewed for the presence of actual or potential drug therapy problems. Demographic and medication data were entered into specially designed data collection forms. Data collected included demographic characteristics such as age, gender, occupation, educational status etc. Also collected are clinical characteristics of patients such as duration of diabetes mellitus diagnosis, comorbidities, presence of complications and medications prescribed during the study period. Medication data include name of drugs, dosage, duration of therapy, formulation, frequency of dosage etc.

CLASSIFICATION, IDENTIFICATION AND ASSESSMENT OF DRUG THERAPY PROBLEMS

The Cipolle/Morley/Strand classification[12] of Drug therapy problems with its seven domains was used in this study. The types of Drug therapy problems and their possible causes were identified from medical records of selected patients using established literature and standard guidelines.[13] At least two references were used to assess appropriateness of drug dosage, possible interaction, adverse drug reaction, contraindications and indications.

BEERS CRITERIA

These criteria[14,15] were used to identify actual and potential inappropriate drugs prescribed for diabetic patients with comorbidities and aged above 65 years.

Data analysis

The data was coded and entered into Microsoft excel which was then loaded into SPSS 20 for descriptive and inferential statistics.

Ethical approval

Ethical approval was sought and obtained from the health research committee of the hospital with reference number **FMC/KF/HREC/004/14.**

RESULTS AND DISCUSSION

DEMOGRAPHIC DATA

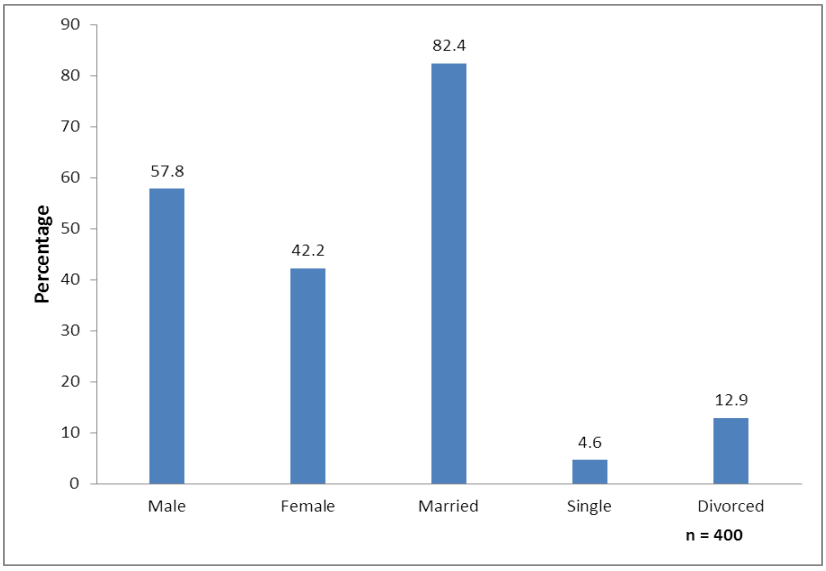

Figure 1

Table 1: Demographic Variables

Number of antidiabetic drugs per prescription	2.1±0.7
Number of drugs per prescription	5.6±2.7
Mean age of patients	57.5±10.5
Mean duration of antidiabetic therapy	4.8±2.2 years
Mean number of hospital visits	5.8±2.6
Mean number of DTP per patient	5.2±2.1

PREVALENCE OF COMORBIDITIES

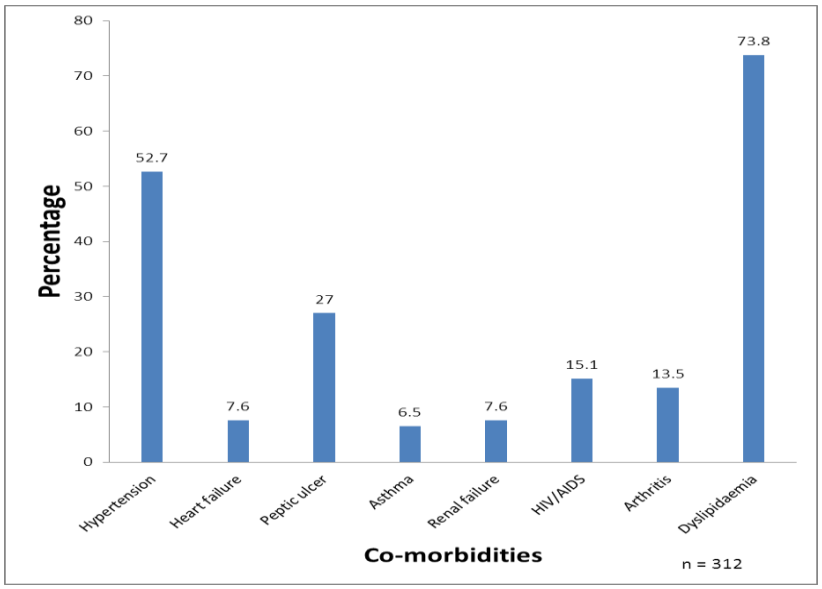

Figure 2

ANTIDIABETIC DRUG PRESCRIPTIONS

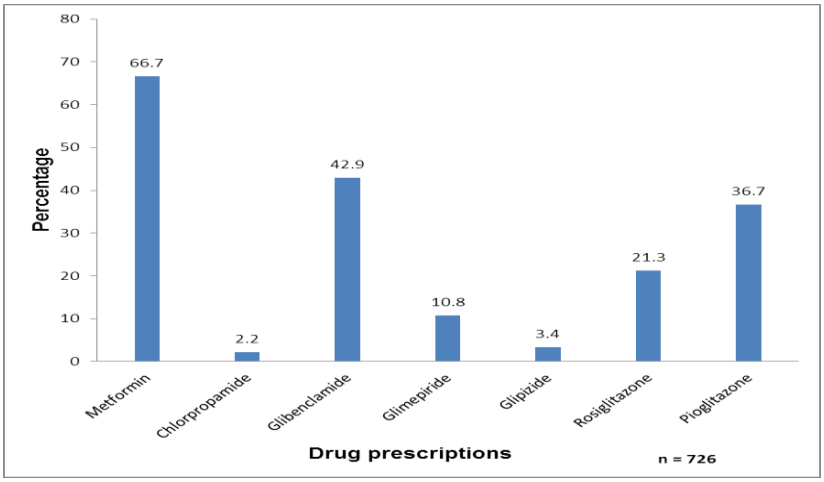

Figure 3

PREVALENCE OF DRUG THERAPY PROBLEMS

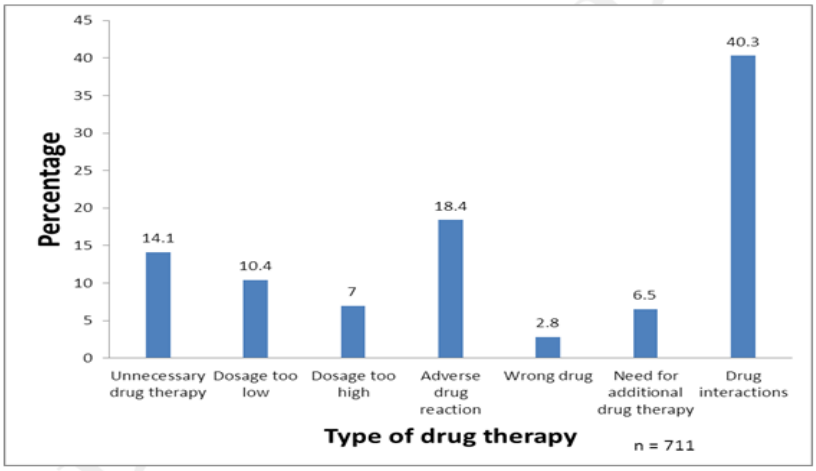

Figure 4

DRUG THERAPY PROBLEMS BETWEEN MALES AND FEMALES

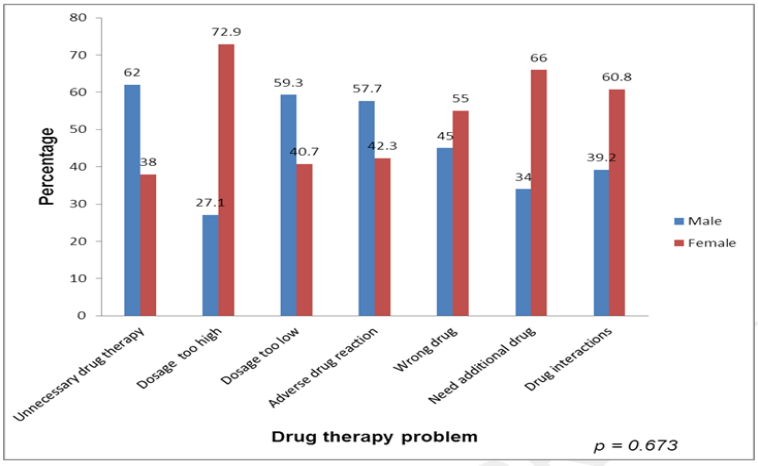

Figure 5

DISCUSSION

Drug therapy is among the most common form of treatment and despite advances made on pharmacotherapy, there remain increased risk of morbidity and mortality from the disease and its complications. While there is little doubt that cost effective therapy has saved the lives of many patients, therapy also contribute significantly to improvement in quality of life. The inappropriate use of drugs can increase risk of morbidity and mortality.[16]

Demographic data from this study indicate that males constituted 57.8% and women the remainder with a mean age of 57.5 years. Other studies reported that prevalence of diabetes mellitus is more in women.[17,18] A range of comorbidities were observed in this study and they included Dyslipidaemia (73.8%), hypertension (52.7%), peptic ulceration (27%) while chronic kidney disease has the prevalence with 7.6%. Chronic kidney disease is reported to affect up to 40% of patients with diabetes mellitus[19], a figure which is much higher than the findings of this study. The prevalence of dyslipidaemia found in this study is much higher than 46% previously reported[20, 21], though hypertension has a higher prevalence of 67%.[22] The differences in prevalence of comorbidities are due to peculiarities of patients sampled and study setting.

Metformin is the most prescribed antidiabetic drug accounting for 66.7% either alone or in combination with other drugs. This is followed by Glibenclamide 42.9% and pioglitazone 36.7% while combination drugs indicate that Metformin and Sulfonylureas was the most prescribed accounting for 51.3% of all antidiabetic drug combinations. A number of studies have previously arrived at the same conclusion.[23,24] The preference of Metformin as the drug of choice in type 2 diabetes mellitus is primarily due to its beneficial effects on cardiovascular system and inherent weight neutral property.[25]

The average number of drugs per prescription found in this study was 5.6 which are higher than 2.6 found in a previous study.[26] High number of drugs per prescription is directly related to presence of comorbidities which ultimately makes Polypharmacy inevitable.[27] There have been suggestions that duration of diabetes and its complications play an important role in choice of therapy. The average duration of antidiabetic therapy found in this study was 4.8 years and the mean number of antidiabetic drugs per prescription was 2.1. This suggests that majority of patients are taking drug combinations of antidiabetic drugs to achieve glyceamic control. Some studies have pointed out that patients with less than five years post diagnosis are generally well managed with single drug while those with longer periods are

more likely to require more drugs.[28, 29] The findings of this study tend to agree with this observation as most patients are on more than one antidiabetic drug.

Drug therapy problems occur frequently in diabetes management particularly where complications or comorbidities coexist. Overall, of the all the prescriptions reviewed, the prevalence of actual or potential drug therapy problems Drug therapy problems (DTPs) was 31.2% and there was no significant difference between male and female patients. Drug interactions accounted for 41.2% of all Drug therapy problems, followed by adverse drug reactions (18.7%) and unnecessary drug therapy (14.1%). In contrast, other studies[30,31] reported that unnecessary drug therapy (32.2%) and adverse drug reactions (31.3%) accounted for the commonly encountered Drug therapy problems other studies however reported lower prevalence of 6.5% for adverse drug reactions[32] and 18%.[33] Unnecessary drug therapy found in this study was 14.1% which is comparable other results[34], but higher than 5.6% earlier reported.[26]

The prevalence of DTPs categories vary widely in studies and reasons advanced this phenomenon included differences in setting, classification system, assessment tools, Polypharmacy and presence of comorbidities or complications of diabetes. There have been several reports that gender is a significant factor in the frequency of DTPs, this observation was not however noted in this study. The mean number of DTPs (5.2) found in this study is fairly comparable to 4.1 previously reported.[26]

Among the significant drug interactions found in this study was the co-administration of Amlodipine and Statins, anti-platelets and anticoagulants and fibrates and statins. Other drugs implicated in drug interactions in this study include beta blockers, NSAIDs, ACEI, Clopidogrel and Thiazides. Several studies have highlighted the fact that serum concentration of Simvastatin increases significantly in the presence of Amlodipine because they are both substrates of CYP3A4.[35] This necessitated limitation of dosage to 10 – 20mg of Simvastatin to reduce the risk of myopathy.[36] It's apparent that prescribers were unaware of this recommendation.

LIMITATIONS

The identification and assessment of DTPs was based on data obtained from medical records.

CONCLUSION

The most prevalent DTPs are drug interactions, adverse drug reactions and unnecessary drug therapy. Majority of antidiabetic medications and drug therapy for comorbidities were appropriate, however drugs for comorbidities increased the incidence of potential and actual DTPs. There was no significant difference between DTPs found in males and females.

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