

RATIONAL USE OF MEDICINES AMONGST ELDERLY DIABETIC PATIENTS IN A TERTIARY HOSPITAL IN SOUTHERN NIGERIA

¹OJIEABU Winifred Aitalegbé,²ERAH Patrick O. M.

¹Department of Clinical Pharmacy and Biopharmacy, Faculty of Pharmacy, Sagamu, Olabisi Onabanjo University, Ago Iwoye, Ogun State, Nigeria.

²Pharmacotherapy Group, Faculty of Pharmacy, University of Benin, Benin City, Nigeria.

Corresponding Author Email: natbelparmacy@yahoo.com

ABSTRACT

International Diabetes Foundation puts Nigeria's national diabetes prevalence rate at 3.9% in year 2013. Number of drugs per patient is the main factor associated with adverse reactions among elderly patients. Objective was to evaluate prescription pattern for elderly diabetic patients. This was descriptive prospective study of 150 case files of older patients diagnosed with type 2 diabetes and receiving treatment in the endocrinology clinic of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State. Data collected included socio-demographic characteristics and pattern of prescribed medications. Data were analyzed with SPSS version 16. $P < 0.05$ was considered significant. Mean age of the group was 65.8 ± 10.0 years. Metformin was the most frequently prescribed (81.3%) and in combination of other antidiabetics, the highest being that with Metformin+Pioglitazone+ Glimepiride (18%). The most commonly prescribed anti hypertensives was lisinopril/Ramipril (50.0%). Mean number of drugs per prescription was 6.0. Patients mostly encountered a range of 5-7 drugs per prescription (63.3%). Drugs prescribed in generics and from essential drug list were significantly lower than the recommended WHO values ($p > 0.05$). The findings indicate that the prescribing pattern could be said to be in compliant with our treatment guidelines although not in line with WHO's recommendations.

Keywords: Medicine, rational, prescribing pattern, elderly, type 2 diabetes, patients

Accepted Date: 14 June 2018

World Health Organization (WHO) projects that by 2030, diabetes mellitus (DM) will become the seventh leading cause of death worldwide (World Health Organization, 2011). The national prevalence rate of diabetes in Nigeria was put at 3.9% in year 2013 (International Diabetes Federation, 2013). A recent study (Akinjinmi *et al.*, 2014), reported a prevalence rate of 14.9% of diabetes mellitus among communities in Abeokuta, Ogun State, Nigeria. Specific problems are faced when prescribing for older patients. This is because they are most times excluded from drug trials often carried out during pre marketing periods. Approved doses for the general population may not therefore be appropriate for geriatric population (Cho *et al.*, 2011). Many medications therefore need to be used with special caution because of age-related changes in pharmacokinetics (i.e, absorption, distribution,

metabolism, and excretion) and pharmacodynamics (the physiologic effects of the drug). Estimates in the United States from 2007 to 2009 revealed 99,628 emergency hospitalized cases in older persons with adverse drug events resulted mainly from over doses (Budnitz *et al.*, 2011). In a study (Alebiosu, 2004) carried out among diabetic-hypertensive patients in OOUTH, Ogun State, the average number of drugs presented was >4 . It was concluded that the prescription pattern of antidiabetics and anti hypertensives did not follow the established hospital guidelines. In a retrospective study carried out in this same location between 2002-2005 to evaluate the prescription pattern and existence of potentially inappropriate medication for elderly diabetic-hypertensive patients the average number of drugs prescribed was 4.95 while the use of

potentially inappropriate medications with high severity occurred in more than 50% of the case notes (Eze & Ojieabu, 2010). With the re-occurrence of irrational prescribing and potentially inappropriate medication coupled with non-adherence to established hospital guidelines, it has become visible that diabetic patients in OOUTH may not be receiving optimal diabetic care. The objective of this study was to evaluate the prescription pattern for elderly diabetic patients using the World health organization and the Nigerian standard treatment guidelines. Specifically to evaluate average drugs per prescription, the most commonly prescribed drugs, proportion of drugs prescribed in generics and from the essential drug list.

METHODOLOGY

Setting

The study was carried out at the endocrinology clinic of Olabisi Onabanjo University Teaching Hospital, (OOUTH), Sagamu, Ogun State, a state government owned tertiary hospital in Nigeria. The hospital has 241 bed spaces and caters for an average of 974 in-patients and 6,486 outpatients monthly.

Study design

Following ethical approval from the hospital's ethics committee, a descriptive prospective study involving review of case files of 150 older patients diagnosed with type 2 diabetes mellitus and receiving treatment in the endocrinology clinic of OOUTH was conducted. The study comprised patients whose case notes fulfilled the inclusion criteria and of age 50 years and above as stated in the WHO definition of older persons (World Health Organization, 2009). Data collected included socio-demographic characteristics, pattern of prescribed medications and number of drugs per prescription. Average of three prescriptions per patient was used.

Subject inclusion criteria

Outpatients with diagnosis of type 2 diabetes mellitus, on hypoglycemic medication(s) for more than three months and receiving medical care from OOUTH for diabetes.

Subject exclusion criteria

Patients with mental incompetence, acute illness,

co-morbidities other than hypertension and those who declined participation.

Instruments

WHO prescribing indicators (World Health Organization, 1993). International Network for Rational Use of Drugs (INRUD) and the Drug Action Programme-WHO (DAP-WHO) developed Core drug use indicators (CDUIs) aimed at the promotion of rational drug use. Prescribing indicators measured included the following:

1. Average number of drugs per encounter, calculated by dividing the total number of drugs prescribed by the number of prescriptions surveyed.
2. Percentage of drugs prescribed by generic name, determined by dividing the number of drugs prescribed by generic name by the total number of drugs, which was then multiplied by 100.

Percentage of drugs prescribed from the essential drug list was determined by dividing the number of products prescribed from the essential drug list of the hospital by the total number of drugs prescribed, and then multiplied by 100. Nigerian Standard treatment guidelines for Nigeria (Nigeria Standard Treatment Guidelines, 2008). Standard treatment guidelines provide a benchmark of satisfactory diagnosis and treatment against which comparison of actual treatments can be made. Secondly, they are a proven way to promote more rational use of drugs.

Data Analysis

Data collected were coded and entered into Microsoft Excel for sorting and SPSS version 16 was used for further analysis. Data were analyzed using descriptive and comparative analyses. Chi-square and Fisher Exact-tests were used for comparison of proportions. Sub-analysis was performed to determine possible relationship between variables. At 95% confidence interval, $P < 0.05$ was considered significant.

Ethical consideration

Ethical approval to carry out the research was sought and obtained from the Ethics Review Committee of OOUTH (OOUTH/DA. 326/271).

Outcome measures: Pattern of medication use by patients, drugs per prescription and proportion of drugs prescribed in generics and from essential drug list.

RESULTS
Socio-demographics of patients

The mean age of the group under study was 65.8±10.0 years. While the majority of subjects (88.7%) were married, 42.4% of the male subjects had secondary education. Half (50.0%) were artisans/technicians etc by profession and about 40% of the patients lived on average monthly incomes of above N30,000 (Table 1).

Pattern of medication use by patients

Of the drugs used in the management of diabetes in the facility, metformin was the most frequently prescribed (81.3%) when compared to other antidiabetic drugs such as pioglitazone (51.3%), glimepiride (42.7%) and Inj insulin (12.7%). The most commonly prescribed antihypertensives was lisinopril/Ramipril (50.0%) followed by losartan/Valsartan (30.7%). (Table 2).

Pattern of drugs per prescription among elderly diabetic patients

Patients mostly encountered a range of 5-7 drugs per prescription (63.3%) when compared to a range

of 2-4 drugs per prescription (24.7%) (p<0.0001). Age range above 69 years had the highest encounter with 5-7 drugs per prescription (78.4%)while age range 50-59 years had the highest encounter with 2-4 drugs per prescription (53.8%). (Table 3).

Distribution of antidiabetics combinations prescribed for patients

Metformin was the most commonly used antidiabetic in combination of two or three with other antidiabetics, the highest being that with Metformin+Pioglitazone+Glimepiride (18%).The least was that with Metformin+Glimepiride+Pioglitazone+Glibenclamide (0.7%). (Table 4).

Comparison of prescribing indicators with WHO standard

Mean number of drugs per prescription was 6.0 and when compared to 1.6-1.8 recommended by WHO was extremely significant (p< 0.0001). The drugs prescribed by generic names and from essential drug list were significantly lower than the recommended WHO values for rational prescribing (p=<0.0001, 0.005 respectively). (Table 5).

Table 1: Socio-demographics of patients

Parameters	Male, N=59 (%)	Female, N=91(%)	Total, N=150(%)
Age (Years), Mean ± SD	65.8 ± 10.0		
50 – 59	20 (33.9)	32 (35.2)	52 (34.7)
60 – 69	16 (27.1)	31 (34.0)	47 (31.3)
>69	23 (39.0)	28 (30.8)	51 (34.0)
Marital status			
Single	2 (3.4)	4 (4.4)	6 (4.0)
Married	56 (94.9)	77 (84.6)	133 (88.7)
Widow/Widower	1 (1.7)	9 (9.9)	10 (6.7)
Divorced	0 (0)	1 (1.1)	1 (0.6)
Family type			
Monogamous	40 (67.8)	52 (57.1)	92 (61.3)
Polygamous	19 (32.2)	39 (42.9)	58 (38.7)
Level of education			
No education	6 (10.2)	17 (18.7)	23 (15.3)
Primary	18 (30.5)	37 (40.6)	55 (36.7)
Secondary	25 (42.4)	23 (25.3)	48 (32.0)
Tertiary	10 (16.9)	14 (15.4)	24 (16.0)
Occupation			
Civil servants, business, etc	15 (25.4)	11 (12.1)	26 (17.3)
Artisan, technician, trader	21 (35.6)	54 (59.3)	75 (50.0)
Retired	19 (32.2)	13 (14.3)	32 (21.3)
Farmers, housewife, others	4 (6.8)	13 (14.3)	17 (11.3)
Average monthly income			
< N5,000-N30,000	35 (59.3)	54 (59.3)	89 (59.3)
>N30,000	24 (40.7)	37 (40.7)	61 (40.7)

N=Number

Table 2: Pattern of drug use by patients

Antidiabetic	Frequency (%)
Metformin	122 (81.3)
Glimepiride	77 (51.3)
Pioglitazone	64 (42.7)
Vidaglipti/Metformin	18 (12.0)
Glibenclamide	7 (4.7)
Glyburide/Metformin	4 (2.7)
Gliclazide	1 (0.7)
Inj insulin	19 (12.7)
Antihypertensive	
Lisinopril/Ramipril	75 (50.0)
Losartan/Valsartan	46 (30.7)
Nifedipine	46 (30.7)
Atenolol	8 (5.3)
Amlodipine	24 (16.0)
Propranolol	0 (0.0)
Amiloride HCl	1 (0.7)
Methyldopa	5 (3.3)

Table 3:Pattern of drugs per prescription among elderly diabetic patients

Number of drugs per prescription	a 50-59 (Yrs) n=52, (%)	b 60-69, (Yrs) n=47,(%)	c >69, (Yrs) n=51,(%)	Total, n=150,(%)	P-Value
2-4	28 (53.8)	5(10.6)* ^{ab}	4 (7.8)* ^{ac}	37 (24.7)	< 0.0001
5-7	20 (38.5)	35 (74.5)	40 (78.4)* ^{ac}	95 (63.3)	< 0.0001
>7	4 (7.7)	7 (14.9)	7 (13.7)	18 (12.0)	

*= Statistically significant, Yrs=Years

Table 4: Distribution of antidiabetics prescribed for patients

Antidiabetic	N, Frequency (%)
Metformin+Pioglitazone	21(14.0)
Metformin+Glimepiride	21(14.0)
Metformin+Glibenclamide	6(4.0)
Pioglitazone+Glimepiride	13(8.7)
Metformin+Pioglitazone+ Glimepiride	27(18.0)
Metformin+Glimepiride+ Pioglitazone+Glibenclamide	1(0.7)
Insulin inj+Metformin	12(8.0)
Insulin inj+Metformin+ Glimepiride+Glibenclamide	2(1.3)
Metformin only	26(17.3)
Glimepiride only	8(5.3)
Pioglitazone only	7(4.7)
Glibenclamide only	6(4.0)
Total	150(100)

Table 5:Comparison of prescribing indicators with WHO standard

Variables	Frequency (%)	WHO Values	P-Value
Total No of drugs (n)	904		
Average drugs per prescription	(6.03±1.44)	1.6-1.8	< 0.0001
Prescribed from the Essential drug list	587(64.9)	100	0.005
Generic drugs	270(29.9)	100	< 0.0001
Injections	19(2.1)		
Antidiabetics	293(32.4)		
Antihypertensives	205(22.7)		
Antipletelets	142(15.7)		
Diuretics	44(4.9)		
Anticholesterolaemia	51(5.6)		
Antiepileptics	40(4.4)		
Antineuritis	20(2.2)		
Vitamins/minerals	26(2.9)		
Ana lgesics	28(3.1)		
Antibiotics	26(2.9)		
Others (e.g antimalarial)	10(1.1)		

DISCUSSION

This study revealed a high rate of unnecessary drugs use among the elderly diabetes patients, putting the number of drugs per prescription at 6, a figure higher than WHO's recommendation although not forgetting to take into cognizance the possibility of co-morbidities in the elderly. This is an indication of polypharmacy and pill burden on patients and on health systems recourses. Irrational prescribing among diabetic patients and those suffering from other chronic diseases are well known (Enwere *et al.*, 2006; Akunne & Adedapo, 2013). Irrational use of drugs was equally observed in this study as neither drug prescription from the essential list nor generic prescription measured up to the WHO recommendations (*World Health Organization, 1993*; Isah *et al.*, 2008). Prescription of medicines in their brand names often results in confusion and duplications of medications as was recorded in this study where Azulux and Amaryl (both brand names of glimepiride, although not shown here) were prescribed for some of the elderly patients in this study. Brand prescribing can also increase cost to the patient. Prescribing by generic name allows flexibility in drug purchase, availability and cost effectiveness that invariably could impact positively on patients' adherence and treatment outcome. This is why the use of essential drugs list becomes a necessity.

Metformin was the most frequently prescribed antidiabetic across board either singly or in combination of two or three other antidiabetics. The finding of metformin to be the highest prescribed antidiabetics is similar to that previously recorded (Shivashankar *et al.*, 2012; Punam & Dhvani, 2010) but differs from the result (Alebiosu, 2004) obtained earlier in this same setting who found above 50% of the prescribed antidiabetic medication to be glibenclamide. Our finding could be said to be in order as metformin is recommended (Nigeria Standard Treatment Guidelines, 2008) for type 2 obese diabetic patients. The use of single and combined antidiabetics is also in line with Nigeria Standard Treatment Guidelines, 2008. A study (Aminu *et al.*, 2011) found a higher of 2 antidiabetic combinations (84.2%) and less of 3 combinations (15.8%) and also found the most commonly prescribed antidiabetic to be metformin. A similar work

(Punam & Dhvani, 2010) found 11.3% and 88.7% to be mono and combination therapies respectively. Prescription of insulin injection was similar to that found by a previous work in this facility (Eze & Odunayo, 2010) but very low as compared to some other studies (Enwere *et al.*, 2006; Adibe *et al.*, 2009). Hypertension was found to be the 2nd main disease treated among these patients. The most commonly employed antihypertensives were lisinopril/ramipril (angiotensin converting enzyme inhibitors). High prevalence of hypertension in type 2 diabetes was also seen in previous studies, (Olurishe *et al.*, 2012; Aminu *et al.*, 2011). To decrease the risk associated with development of cardiovascular disease, target blood pressure should be aimed at. The use of angiotensin converting enzyme inhibitors as the most common antihypertensive agents in this study is consistent with that of (Olurishe *et al.*, 2012; Aminu *et al.*, 2011) but differs from that of (Arije *et al.*, 2007). The role of ACE inhibitors in the reduction of cardiovascular associated morbidity and mortality has been established in an earlier study (The Heart Outcomes Prevention Evaluation Study Investigators, 2000).

Conclusion

The findings in this study indicate that the prescribing pattern could be said to be in compliant with our country's treatment guidelines although not in line with the WHO's recommendations on rational drug use as our values differed significantly. Rational drug use should be encouraged and adhered to in this facility because it could translate to reductions in mortality, morbidity and cost of treatment. Furthermore, addressing polypharmacy observed in this study has the potential of reducing health expenditure both for the individual patient and nation. Periodical evaluation of prescribing patterns should be employed to increase therapeutic efficacy, decrease adverse effects, avoid unnecessary increase in the cost of health care and provide feedback to the prescribers.

Conflict of Interests: The authors declare no conflicts of interests associated with this work.

REFERENCES

- Adibe, M. O., Aguwa, C. N., Ukwe, C. V., Okonta, J.M. & Udeogaranya, P.O. (2009). Outpatient utilization of anti-diabetic drugs in the South Eastern Nigeria. *International Journal of Drug Development and Research*. 1(1):27-36.
- Akinjinmi, A. A., Adeyooye, O. A., Akingbade, O. A. & Okerentugba, P.O. (2014). Prevalence of Diabetes mellitus in Abeokuta, Ogun state, Nigeria. *Researcher*. 6 (2):73-75.
- Akunne, O. O. & Adedapo, A. D. A. (2013). Comparative assessment of prescription quality among hypertensive patients in South-West Nigeria. *International Journal of Pharmacy and Pharmacology*. 32 (6): 094-098.
- Alebiosu C. O. (2004) Antidiabetic / Antihypertensive prescription profile in OSUTH, Sagamu and environment. *Nigerian Journal of Clinical Practice*. 7(1):15-20.
- Aminu, C., AbdulGafar, O., Jimoh, A. A. & Sabir, Z. S. (2011). Pattern of Antidiabetic Drugs Use in a Diabetic Outpatient Clinic of a Tertiary Health Institution in Sokoto. *Journal of Medical Sciences*. 11:241-245.
- Arije, A., Kuti, M., Fasanmade, A., Akinlade, K., Ashaye, A., Obajimi, M. & Adeleye, J. (2007). Control of hypertension in Nigerians with Diabetes Mellitus: A report of the Ibadan Diabetic / Kidney Disease Study Group. *International Journal of Diabetes & Metabolism*. 15:82-86.
- Budnitz, D. S., Lovegrove, M. C., Shehab, N. & Richards, C. L. (2011). Emergency hospitalizations for adverse drug events in older Americans. *New England Journal of Medicine* 365:2002.
- Cho, S., Lau, S. W., Tandon, V., Kumi, & K., Pfuma, E. (2011). Abernethy DR. Geriatric drug evaluation: where are we now and where should we be in the future? *Archive of Internal Medicine*. 171(10):937.
- Enwere, O. O., Salako, B. L. & Falade, C. O. (2006). Prescription and Cost Consideration at a Diabetic Clinic in Ibadan, Nigeria: A Report. *Annals of Ibadan Postgraduate Medicine*. 4 (2):35-39.
- Eze, U.I.H. & Ojieabu, W.A. (2010). Pattern of Prescriptions among Elderly Diabetic-Hypertensive Patients in a Nigerian Teaching Hospital. *Africa Journal of Biomedical Research*. 13(3):169-173.
- Eze, U. I. H., Odunayo, O. O. (2010). Evaluation of drug use among diabetic hypertensive patients in a teaching hospital. *International Journal of Drug Development and Research*. 2 (4):703-710.
- International Diabetes Federation. (2013). IDF Diabetes Atlas, Switzerland: (6th ed).
- Isah, A. O., Ross-Degnan, D., Quick, J., Laing, R. & Mabadeje, A. F. B. (2008). The development of standard values for the WHO drug use prescribing indicators. INRUD – Nigeria 1. Support Group 2: DAP WHO 3. International conference in improving use of medicines. (ICIUM).
- Nigeria Standard Treatment Guidelines 2008. Federal Ministry of Health, Nigeria.
- Olurische, C. O., Steven, S. Gyang., Temidayo, O. Olurische. & Titus, T. Shekarau. (2012). Drug Utilization Review of Anti-Diabetic Medications and Therapeutic outcome in type 2 Diabetes in a Tertiary Hospital in Northern Nigeria. *West African Journal of Pharmacy*. 23(2):58-64.
- Punam, S., Dhvani, K. (2010). Prescribing Trends Of Antidiabetics In Diabetic Patients And Hypertensive Diabetic Patients In An Urban Secondary Care Hospital. *International Journal of Pharmaceutical and Biological Archives*. 1(2):249-255.
- Shivashankar, V., Sriram, S., Rajalingam, B., Manjula, Devi. A.S., Chitra, B. & Vidhya, D. (2012). Study on Impact of Pharmacist Intervention with Type 2 Diabetic Patients. *Pharmacie Globale (International Journal of Comprehensive Pharmacy)*. 11(9):1-3.
- The Heart Outcomes Prevention Evaluation Study Investigators. (2000). Effects of an Angiotensin- converting-Enzyme Inhibitor, Ramipril, on Cardiovascular Events in high-risk patients. *New England Journal of Medicine*. 342:145-153.
- World Health Organization Action Programme on Essential Drugs. (1993). How to Investigate Drug Use in Health Facilities: Selected Drug Use Indicators. Geneva, *World Health Organization WHO/DAP/93.1*.
- World Health Organization (2009). Definition of an old or older person. Health statistics and health information systems. (*World Health Survey*). WHO.
- World Health Organization (2010). Global Status report on non-communicable diseases (2011). Geneva, WHO: 176.