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Knowledge of Disease and Adherence to Drug Therapy in Persons with Type 2 Diabetes and Hypertension

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Abstract

This study was carried out to determine the level of knowledge of disease and adherence to drug therapy among patients with Type 2 diabetes and Hypertension. One hundred and seventy-seven (177) patients attending cardiology and endocrinology clinics at University College Hospital (UCH) Ibadan, in Nigeria participated in the study. Socio-demographic characteristics, patients' knowledge of diabetes and hypertension and adherence to drug therapy were determined with the use of pre-tested questionnaires. Anthropometric measurements and blood pressure were taken with fasting blood glucose.Exactly 45.2

Index terms— Type 2 Diabetes mellitus, Hypertension, Adherence, Knowledge Running title: Knowledge of Disease by Diabetics and Hypertensives

iabetes and Hypertension are chronic illness which requires a life-long management. Hypertension is common in patients with type 2 diabetes with a prevalence of 40-60% over the age range of 45-75 **??**Turner et al, 1998). The interrelationship of the dual diagnosis of hypertension and diabetes is significant with diabetes diagnosed 2.5 times more in hypertensive patients **??**Grass TW et al, 2000). The incorporation of the patient in the management of his disease condition is very vital in the management of persons with Diabetes and Hypertension because the management of such chronic illnesses, the likelihood for non-adherence to medication may increase in patient. Some patients are not aware of the chronic nature of their conditions and therefore believe a short term treatment will totally cure them of the disease. This has led to abrupt discontinuation of medications among patients resulting in an exacerbation of their conditions. (Diabetes control and complications Trial Research group 1993)

Consistent control of blood pressure, consistent control of blood glucose, adherence to medication and dietary regiments are very important in patients with hypertension and diabetes mellitus (Haffner SM, et al 1998 **??** Stern MP 1998). Patients' poor understanding of the disease, poor understanding of proper use of the medications as well as the benefits and risks of treatment have been identified as some of the patientrelated barriers to adherence **??**Osterberg and Blaschke, 2005). Adequate knowledge of the disease and of the benefit and risk of treatment will therefore be required in the management of patients with chronic conditions such as diabetes combined with hypertension.

Patients with type 2 diabetes and hypertension see the pharmacists often. The pharmacists are therefore in a good position to have a significant impact on the quality of care of such patients by providing adequate counselling about the disease conditions and the medication used in their management. (Brian Cross 2006, Stephen M Setter, et al 2006) The main objective of this study is therefore to determine the level of knowledge of patients with hypertension complicated with type 2 diabetes about their disease condition and the level of their adherence to recommended drug therapy with the goal of providing and promoting pharmaceutical care.

This study was carried out among patients attending the endocrine and cardiology clinics of the University College Hospital, Ibadan. One hundred and seventy -seven (177) patients comprising patients with type 2 diabetes alone, patients with hypertension alone, and patients with type 2 diabetes coexisting with hypertension were involved in the study.

The study was carried out within a period of nine weeks of between August 4th to October 5th 2010. Informed consent was obtained from all patients with structured questionnaires covering demographic data, duration of disease diagnosis, disease knowledge and self-reported medication adherence.

Type 1 diabetes patients, pregnant patients, immune-compromised patients and mentally retarded patients were excluded from the study. Stratified random sampling was used in sampling population for the study. Stratification was based on sex and both sexes were fairly represented in the sample population.

The study was cross-sectional and consisted of a well structured questionnaire which was interviewedadministered. The study was carried out every Monday and early before the usual clinic time of 10.00am. The interviewers were research assistants recruited and trained for this purpose. The non-English speaking patients were interviewed by the interviewers who interpreted the contents of the questionnaires into local yoruba language.

The questionnaire consisted of seventeen relevant knowledge questions, eleven of which were strictly on hypertension, five on diabetes and one on both diabetes and hypertension. These questions were drawn from standard knowledge test on diabetes and hypertension. The median score (50th percentile) which was eleven was chosen as the cut-off value. Patients with eleven points and above had good knowledge while patients with scores below eleven points had poor knowledge.

The data obtained from each questionnaire were entered using Epi info. Analysis was done using the Statistical Package for Social Sciences (SPSS) Version XV (15). Results were presented in frequencies, percentages, means and standard deviations. Two categorical variables were compared using the Chisquare test and two unrelated variables were compared using Pearson correlation. **??**tatistical A total of one hundred and seventy-seven (177) patients who met the inclusion criteria were included in the study. Eighty (80) (45.2%) of the patients were males while 97 (54.8%) were females. Exactly 24% of these patients had type 2 diabetes alone, 20% had hypertension alone and 56% had type 2 diabetes coexisting with hypertension. The age ranges from 33years to 87 years with a mean of 63.2years. Most of the patients studied were traders (35.6%). Others were Civil servants (13.6%), Retired (10.2%), Businessmen (6.8%), Artisans (5.6%), Professionals (3.4%), Clergy (3.4%) with 6.2% being unemployed while 15.3% did not specify their occupation. Exactly 27.1% had no formal education, 28.2% had primary education, 14.1 % had secondary education, and 6.2 % had vocational education while 24.1 % had tertiary education. Majority of the study population (80.8%) were married while 19.2% were either widowed or divorced.

The details of the socio-demographic characteristics of the study population are presented in Table 1. Seventeen questions were asked to test patient's knowledge on diabetes mellitus and hypertension. Exactly 63 (35.6%) patients knew their blood pressure within five days prior to clinic visit and 65 (36.7%) patients knew the optimum blood pressure for patients with both diabetes and hypertension while 140 (79.1%) knew high blood pressure could cause heart attack. Exactly 161(91%) knew high blood pressure could cause stroke and 107 (60.1%) patients knew that diabetes could cause kidney failure while 98 (55.4%) knew that high blood pressure could cause kidney failure. Exactly 119 (67.2%) believed a blood pressure of 140/90mmHg was normal while 132 (74.6%) believed a blood pressure of 160/90mmHg was high. Questions asked and responses are summarized in the Table 2.

The level of knowledge on diabetes and hypertension was determined from relevant questions with a maximum of 17 points and the median (representing the 50th percentile, 11points) was used as the cut-off point to categorise knowledge as already described in the methodology section. A total of 112 (63.3%) had good knowledge while 65(36.7%) had poor knowledge. This is summarised in Table 3.

Males in this study had more basic formal education than females as 16.3% of the males had no formal education while the percentage of those without formal education among the females (36.1%) double that of males (16.3%). Exactly 31.3% males had a tertiary education while this was only 18.6% in females. A statistically significant association exists between sex and education among the study population ($p<0.05$). This is shown on Table 4.

Patients who failed to take medication on purpose gave various reasons why they did so. Exactly 10.2% said they did so when their medication finished, 6.1% claimed financial constraint as reason why they deliberately discontinued medications, 6.1% claimed forgetfulness; others failed to adhere when fasting (2%), when busy (2%), when sick of fever (4.1%), when they travelled (4.1) , inconvenience of the doses (4.1%), based on faith (2%), polypharmacy (2%), felt better (2%) while greater proportion (55.1%) did not give any response when asked why they failed take medication on purpose. These are summarized on Table 5 Questions on adherence were used to assess patients' adherence to drug therapy. Patient with 80% scores and above were regarded as adherent to drug therapy. Table 6 summarizes the degree of adherence among the study population.

Adherence was determined among the different disease groups. Exactly 54.8% of patients with type 2 diabetes alone reported adherence to medications, 69.4% of those with hypertension alone were adherent and 56.6% of patients with both diabetes and hypertension combined reported adherence to drug therapy. The association between adherence and disease type was however not statistically significant ($p<0.05$). This is summarized on **??**rass TW et al 2000).This study clearly indicated that hypertension alone is a disease of the older adults and diabetes is also more pronounced in older adults than younger adults. It follows that hypertension and diabetes combined is a disease of older adults above the age of 50 years. The result from this study was in agreement with above findings in that among the patients 18 (10.2%) with age group less than 50 years, 7 (38.9%) had diabetes alone, 3 (16.7%) had hypertension alone and 8 (44.4%) had hypertension combined with type 2 diabetes. There were less percentage of patients with hypertension and type 2 diabetes as separate disease when compared with patients that combine hypertension and diabetes. The result also showed that 19 (54.3%) of patients between

50 and 59 years had hypertension compared with diabetes while only 9 (25.7%) and 7 (20.0%) had diabetes and hypertension alone respectively. Among the age of between 60 and 69 years, there were more patients 46 (61.3%) with hypertension combined with diabetes when compared with 14(18.7%) and 15(20.0%) of those having diabetes alone and hypertension alone respectively. (Table1).

Among patients who were above the age of 70 years, 26 (53.1%) had combined disease of hypertension and type 2 diabetes while 12 (24.5%) and 11 (22.4%) patients had diseases separately and respectively.The result also indicated that irrespective of other socio-demographic characteristics such as sex, occupation, educational level and marital status, there were more patients with hypertension and diabetes combined than patients with type 2 diabetes alone and hypertension alone (Table1).

Table 2 indicates that majority of the studied population 101 (57.1%) did not know their blood pressure within the last five days of this study. However, the majority of the studied population were well aware of the complications such as heart attack, stroke and kidney failure that could result in patients having diabetes complicated by hypertension while majority of the population were not aware of the fact that cancer could result from either hypertension and diabetes. The awareness of majority 148 (83.6%) that patients with hypertension and diabetes should take their medicine could be due to universal education provided through the Joint National Committee (JNC) on the Detection, Evaluation and Treatment of high blood pressure in their four (4) reports comprising JNC IV (1992), JNC V (1996), JNC VI (2000) and JNC VII (2006) (Robert T. Weibert (1992), Robert T. Weibert (1996), Robert T. Weibert (2000) and L. Brain Cross 2006). The JNC reports set forth recommendations to help health care providers improve the assessment and management of patients with hypertension and its complications which includes diabetes. Awareness of hypertension has improved from 50% during the period 1976-1980 to 70% during the period 1999-2000. Likewise, the percentage of hypertensive patients receiving therapy and the percentage of those receiving therapy actually reaching recommended BP goals have increased from 31% to 59% and 10% to 34%, respectively, during the same time period. Death from stoke and coronary heart disease (CHD) has decreased by approximately 50% since 1972. These numbers represent significant improvements resulting from increased public and medical community awareness (Brian Cross, 2006). Education provided by the Diabetes Control and Complication Trial (DCCT, 1998) along with twenty years United Kingdom Prospective Study (UKPDS) is also beneficial as it confirmed the effect of the benefit of strict glycemic control in patients with type 2 diabetes and its complications which includes hypertension. UKPDS thus provides additional education to help health care professionals to treat diabetes and hypertension. Results of the two landmark studies have shown that there was a 41% reduction in risk of macrovascular diseases according to DCCT research group in 1998.The following results according to UKPDS showed 25% reduction in macrovascular diseases with intensive blood glucose control with sulfonyl urea and insulin, 37% reduction in macrovascular disease with tight blood pressure control (<150/85mmHg) in hypertensive patients. Atenolol (betablocker) and captopril (ACE inhibitor) in risk reduction of microvascular and macrovascular complications showed that both agents (atenolol and captopril) are equally effective in maintaining blood glucose control and that their was no difference in risk of macrovascular and microvascular diseases between atenolol and captopril (4 reports of UKPDS group,1998, Davis M, Mellus H et al 1999).

Table 3 shows the levels of knowledge of diabetes and hypertension across socio-demographics of the studied population. According to this table, the level of good knowledge of diabetes and hypertension was higher in males 59 (73.8%) than females 53 (54.6%).The association between general knowledge and sex was statistically significant ($p=0.009$) ($p<0.05$). Knowledge was evenly distributed across the age group as over 60% of the studied population had good knowledge of diabetes and hypertension. Studies (Aviles et al, 2007, Sanne et al, 2008) had shown that being younger was not a factor in having good knowledge of diabetes and hypertension. However, there was no significant association between knowledge and age ($p=0.991$) ($p>0.05$).

Knowledge of diabetes and hypertension generally increased across levels of education with patients with no formal education having lesser knowledge than those with primary, secondary and tertiary education. This result depicted the fact that patients with higher education are more knowledgeable about their disease conditions (Sanne et al, 2008). There was a significant association between educational level and knowledge ($p=0.00$) ($p<0.05$).

Over 90% of patients who are civil servants and retired had good knowledge of hypertension and diabetes.Patients who are civil servants and those retired are likely to be most educated among the studied population. There was a significant association between occupations and knowledge ($p=0.007$) ($p<0.05$) (Table 3).

A study (Nisar et al, 2008) indicated that males were more knowledgeable than females on diabetes in contrast to another study on hypertension (Busari et al, 2010) where females were found to be more knowledgeable than males. This study showed that males were more knowledgeable in the combination of hypertension and diabetes as a disease probably because males were more educated than females in the studied population. There were 13 (16.4%) males with no formal education in comparison with 35 (36.1%) females with no formal education. The association between gender and educational level is statistically significant ($p=0.04$) ($p<0.05$) (Table 4).

A little under 60% of the study population were adherent to drug therapy as measured by self-reported methods. This was very low. Patients who missed doses of their medications gave various reasons for doing so, with 27.7% of the study population missed their medications on purpose, 24.9% did so when they forgot, 8.5% and 6.8% missing their medication when they felt worse or better respectively. Forgetfulness was the major

singular reason why medications were missed and it has been implicated as one of the major reasons why doses of medications are missed in patients with type 2 diabetes (Adisa et al, 2009) and hypertension **??**Omole et al, 2008; **??**l-Mehza et al, 2009). Among patients who gave reasons for deliberately missing doses of their medications, those who stopped medication when drugs were exhausted comprised a greater percentage. Other reasons given were financial constraints, when fasting, inconvenience of doses, polypharmacy and some also ?used faith'. (Table 5)

Age groups 60-69years and 70 years and above had the highest percentage (65.3%) of patients who were adherent respectively each and there is a statistical significance association between self-reported medication adherence and age group (p=0.037) (p<0.05) (Table 6) The higher degree of medication adherence in the older age groups could be explained by the fact that patients in this age groups comprised 72.8% of those with diabetes co-existing with hypertension and have learnt the importance of using their medication overtime; This is contrary to report from another study which reported high level of medication non-adherence among the elderly (Sweileh et al, 2005). Patients with hypertension alone had adherence rate of 69.4% which is higher than adherence in patients with diabetes alone and in patients with diabetes and hypertension combined. This reported rate of medication adherence in patients with hypertension is higher than that seen in other reports (Omole et al, 2010, Sweileh et al, 2005). About 66.7% of patients with no formal education adhered to their medication and this was higher than adherence in any of the other educational levels which suggests that these patients knew the clinical importance of their medication regardless of their low educational level; and this could be as a result of provision made for patients education in local language in this centre to ensure better understanding of diabetes and hypertension by the non-English speaking population. Contrary to this, other studies (Omole et al, 2010; Sweileh et al, 2005) showed a least compliance in patients who were illiterate. There was no significant association between self-reported medication adherence and educational level. (p=0.683) (p=0.05) (Table 6). Although 54.8% of patients with type 2 diabetes reported adherence to drug therapy, which was lower than that for patients with hypertension being 69.4%; however, 56.6% of the total number of patients who were reported adherence to medication had type 2 diabetes co-existing with hypertension. There was no significant association between the disease group and adherence (p=0.34) (p>0.05). (Table 7)

Although, this study revealed a higher than average level of disease knowledge among all the patients, patients who had type 2 diabetes were less knowledgeable about their disease conditions than those with hypertension. There is therefore the need to increase patients' education when diabetes is complicated with Hypertension. This requires the concerted effort of all members of the healthcare team.

1 March

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Diabetes in people older than 20 years account for 90%,while diabetes in people below 20 years account for only 10% of all cases. Half (50%) of all cases of diabetes occur in adults over the age of 55 and approximately 55 years. About 18% of the older population who are above 60 years have diabetes (Stephen M. Setter et al 2006). The inter relationship of the dual diagnosis of hypertension and diabetes is significant with diabetes being diagnosed 2.5 times more often in hypertensive patients (Stephen M Setter et al 2006). The prevalence of the metabolic syndrome which combines hypertension and diabetes is highly age dependent. The disease is more common in older patients above the age of 50 years and the prevalence of this metabolic disease increases with age (Chobanian et al 2003). One of this condition predisposes to other (Turner et al 1998,

Figure 1: Table 7

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Diabetes alone N(%)	Hypertension alone N(%)	Hypertension and Diabetes N(%)	TOTAL N(%)

Figure 2: Table 1 .

2

Questions	Responses N(%)		
	Yes	No	Not Sure
Do you know your BP within the last five days.	63(35.5)	101(57.1)	13(7.35)
Do you know the optimum BP for a person with both DM and HTN?	65(36.7)	71(40.1)	41((23.2)
High BP can cause Heart attack	140(79.1)	14(7.9)	23(13.0)
High BP can cause stroke	161(91.0)	5(2.8)	11(6.2)
High BP can cause cancer	27(15.3)	55(31.0)	59 (33.3)
DM can cause kidney failure	107(60.5)	11(6.2)	95(53.7)
High BP can cause kidney failure	98(55.4)	23(13.0)	56(31.6)
DM can cause can cause cancer	29(16.4)	48(27.1)	99(55.9)
	High	Low	Normal
If someone"s BP is 120/80mmHg, it is	15(19.5)	48(27.1)	99(55.9)
. If someone"s BP is 160/100mmHg, it is	132(74.6)	1(0.6)	4(2.3)

Figure 3: Table 2 .

3

Figure 4: Table 3 (

4

Figure 5: Table 4

5

	Good Knowledge	Poor knowledge	Chi square	P Value N(%)
Sex				
Male	59 (73.8)	21 (26.3)	6.891	0.009
Female	53 (54.6)	44 (45.4)		
Age Group				
<50	12 (66.7)	6 (33.3)	0.104	0.991
50-59	22 (62.9)	13 (37.1)		
60-69	47 (62.7)	28 (37.3)		
70+	31 (63.3)	18 (36.7)		
Married				
Married	92 (64.3)	51 (35.7)	0.359	0.549
Divorced/Widowed	20 (58.8)	14 (41.2)		
Educational Level				
No Formal	13 (27.1)	35 (72.9)	45.609	0.00
Primary	32 (64.0)	18 (36.0)		
Secondary	19 (76.0)	6 (24.0)		
Vocational	8 (72.7)	3 (27.3)		
Tertiary	40 (93.0)	3 (7.0)		
Occupation				
Artisan	7 (70.0)	3 (30.0)	28.677	0.00
Civil Servant/Retired	38 (90.5)	4 (9.5)		
Trader/Businessman	30 (43.5)	39 (56.5)		
Professional/Clergy	15 (83.3)	3 (16.7)		
Unemployed	7 (64.7)	4 (35.3)		

	SEX N (%)			
	Male	Female	Chi-Square	P value
Educational Level				
No formal	13 (16.3)	35 (36.1)		
Primary	24 (30.0)	26 (26.8)		
Secondary	12 (15.0)	13 (13.4)	9.892	0.04
.Vocational	6 (7.5)	5 (5.2)		
Tertiary	25 (31.3)	18 (18.6)		

Figure 6: Table 5

6

Reasons	Frequency N (%)
When drugs are finished	5 (10.2)
Forgetfulness	3 (6.1)
Financial constraints	3 (6.1)
Inconvenience of doses	2 (4.1)
Travelled	2 (4.1)
Sick/not feeling too good	2 (4.1)
Busy	1 (2.0)
Fasting	1 (2.0)
"Using faith"	1 (2.0)
Felt better	1 (2.0)
Polypharmacy	1 (2.0)
No response	27 (55.1)
Total	49 (100)

	Yes (Adherent)	No (Nonadherent)	Chi Square	P value N(%)
Sex				
Male	46 (57.5)	34 (42.5)	0.095	0.758
Female	58 (59.8)	39 (40.2)		
Age Group				
< 50	6 (33.3)	12 (66.7)	8.505	0.037
50-59	17 (48.6)	18 (51.4)		
60-69	49 (65.3)	26 (34.7)		
70+	32 (65.3)	17 (34.7)		
Marital Status				
Married	84 (58.7)	59 (41.3)	0.00	0.993
Divorced? Widowed	20 (58.8)	14 (41.2)		
Educational Level				
No formal Education	32 (66.7)	16 (33.3)	2.286	0.683
Primary	29 (58.0)	21 (42.0)		
Secondary	14 (56.0)	11 (44.4)		
Vocational	5 (45.5)	6 (54.5)		
Tertiary	24 (55.8)	19 (44.2)		
Occupation				
Artisan	6 (60.0)	4 (40.0)	0.171	0.997
Civil servant/Retired	25 (59.5)	17 (40.5)		
Trader/Businessman	42 (60.9)	27 (39.1)		
Professional/ Clergy	11 (61.1)	7 (38.9)		
Unemployed	6 (54.5)	5 (45.5)		

Figure 7: Table 6

8

Self-reported medication Adherence N (%)	Adherence	Non-adherence	Chi Square	p value
Disease group				
Diabetes	23 (54.8)	19 (45.2)		
Hypertension	25 (69.4)	11 (30.6)	2.17	0.34
Diabetes and Hypertension	56 (56.6)	43 (43.4)		

Figure 8: Table 8

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