



ISSN 2278 – 0211 (Online)

Patients' Adherence to Type-2 Diabetes Mellitus Treatment Recommendations

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Abstract:

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder that has existed for centuries and the most common form of diabetes in adults. Its management encompasses dietary modification, exercise, accident prevention and medications (oral hypoglycemic agents and insulin). Due to the chronic nature of T2DM, adherence to treatment recommendations remain a challenge for many patients. This study aimed at assessing the adherence of patients with T2DM to treatment recommendations in some selected Peri-urban Hospitals in the Kumasi Metropolis of Ghana. The study deployed the positivist paradigm and descriptive research design. Stratified sampling technique was employed to randomly select 200 diabetic patients for the study. Questionnaire was the main instrument used in gathering primary data. SPSS version 23 was used to analyze the field data. The study revealed a statistically significant (p -value < 0.05) association between: participants' age and adherence to exercise; participants' age and adherence to accidents prevention measures; participants' education and adherence to dietary restrictions. However, adherence to medications had no statistically significant relationship with participants' socio-demographic variables. The study concluded that, although, knowledge on type-2 DM medication is high, adherence to treatment recommendations still pose a challenge for many patients. Of particular interest to this study is that respondents' age alone significantly controls exercise and risk prevention. Hence a massive public health education across all age groups is required in addition to policy support.

Keywords: Type-2 Diabetes mellitus, adherence, compliance, medications, Ghana

1. Background

Diabetes is counted among the World Health Organization (WHO) lists of world dangerous killer diseases. Diabetes is a chronic metabolic disorder caused by insufficient insulin production or insulin resistance. The two most common forms of diabetes are Diabetes Mellitus (DM) and Diabetes Insipidus (DI). Type-2 diabetes mellitus (T2DM) have been variously studied (Barnes *et al.*, 2004; Ghosh, *et al.*, 2010; Kaku, 2010; Kayode *et al.*, 2012; LaSalle & Berria, 2012; Pourghaznein *et al.*, 2013) across the globe with emerging cases being recorded in the Sub-Sahara African regions.

Adherence to diabetic treatment recommendations is an aspect which has received most research attentions within the last decade. Adherence to prescribed hypoglycemic agents, insulin, dietary modifications, exercises, and accident prevention measures still remain a major challenge and focus of most recent studies (See e.g Ghosh, *et al.*, 2010; Kaku, 2010; Mann *et al.*, 2009; Omar & San, 2014). For instance, according to Omar & San (2014) who determined the knowledge level and medication adherence level among type 2 diabetes mellitus geriatric in-patients; the researchers reported that 53.7% of geriatric in-patients had knowledge about their health status and 66% had also developed high adherence levels to medication. However, as their ages appreciate, their knowledge base regarding diabetes also declined.

Meanwhile, Pourghaznein *et al.* (2013) examined the relationship between health beliefs and medication adherence in patients with type 2 diabetes. The study found numerous challenges encountered by patients with Type 2 diabetes; among them were lack of information and knowledge on proper diet, lack of motivation for regular follow-up due to time and lack of diabetes treatment. Furthermore, Damnjanovic *et al.* (2015) investigated self-medication using medicinal plants and the potential influence of health care professionals' advice or media information regarding the use of herbal dietary supplements with hypoglycemic effect in a population of patients with type 2 DM. In this study, women were observed to have developed positive preference for the use of herbal medicine than men. However, there were many recorded cases among people who used herbal drug supplement with the media being blamed for using their medium to promote self-medication with herbal supplements.

Moreover, Ingle & Talele (2012) explored the Adverse Effects of Metformin in Combination with Glimepiride and Glibenclamide in Patients with Type 2 Diabetes Mellitus. The study discovered that combining Metformin and Glimepiride are effective in treating diabetes. The combination of the two processes neutralizes body weight and reduces risks of hypoglycaemia. Iqbal, *et al.*, (2014) evaluated doctors' adherence to Malaysian Clinical Practice Guideline (CPG) 2009 in established diabetic patients with hypertension, dyslipidemia, renal diseases, obesity, and also assessed factors associated with guideline adherence and diabetes mellitus control in Pulau Pinang Hospital, Malaysia. The study found that 72.7% mostly undertake health care in pharmacotherapy, 62.3% had high blood glucose. It was concluded that doctors poorly adhered to health treatment or management guidelines.

Kheir *et al.* (2010) determined the capability of Medication Event Monitoring System (MEMS) in providing meaningful estimates of adherence within indigenous Qatari population. Using 54 people to carry out a pilot program, 67.7% were found to respond to daily treatments. However, the Medication Event Monitoring System (MEMS) found a poor relation between KAP and adherence at the broader stage and the study concluded that MEMS will have difficulty accessing adherence in this part of the world where people take more than necessary from health workers and take their own dosage at their own preferred time.

Kayode *et al.* (2012) also sought to determine the level of knowledge of disease and adherence to drug therapy among patients with Type 2 diabetes and Hypertension. Their findings showed that 45.2% were males whereas 54.8% were females, with those suffering from Type 2 diabetes being 23% and 20.3% being hypertensives while 55.9% had both Type 2 diabetes and hypertension. 64% of the respondent had knowledge about Type 2 diabetes and hypertension while 58.8% adhered to their medications.

Gupta, & De, (2012) examined Diabetes Mellitus and its Herbal Treatment with the study proving that over 300 million people are affected by diabetes mellitus worldwide. At the spring of diabetes, remedies such as allopathic also evolved but had a risk of side effect and also being costly. Hence treating diabetes with herbal extract is less complicated and do not involve laborious pharmaceutical synthesis. It was established that herbal drugs are more efficacious in treating diabetes and has less side effect than the laborious pharmaceutical synthetic anti-diabetic drug. The authors therefore proposed that more alternative drugs in the field of therapy and other related medical fields need to be developed for the treatment of diabetes.

Kaku (2010) assessed Pathophysiology of Type 2 Diabetes and Its Treatment Policy. Kaku (2010) concluded that as population is aging, cases of diabetes becomes easily susceptible to contract and hence needs a large number of people to help control the spread of diabetes and not only medical professionals. Chua & Chan (2011) examined the prevalence of non-adherence to antidiabetic medications in a Malaysian tertiary hospital and its association with patients' glycaemic outcomes. The study discovered that 41.7% of the respondents did not take their medication as prescribed basically due to forgetfulness and few people 17.4% combined both oral and insulin methods of medication to achieve the right results. This implies that those who adhere to their medication improves their status and boost their health condition hence the need for pharmacists to embark on education to inform patients with diabetes to develop positive attitude towards adherence to drug usage.

Ghosh, *et al.*, (2010) assessed the influence of patient counseling on patients' perception about the disease management and quality of life in type II diabetes mellitus patients. It was revealed that developing positive lifestyle such as good eating habit, exercising and adherence to medication. In furtherance, the researcher proposed there should be collaboration between pharmacological and non-pharmacological health practitioners to develop a more comprehensive approach to managing diabetes. It was observed that most of the patients did not allude to the positive lifestyle associated with the management of diabetes.

Shrestha *et al.* (2013) assessed the adherence pattern to OHAs and clinical outcomes with special reference to fasting blood glucose (FBG) level and glycosylated hemoglobin (HbA1c) levels. Findings revealed that 25% of the patients stopped undertaking OHAs, 38% missed it, 72% attributed it to internal cessation, preceded by 42.9% who reportedly said they usually forget, 30.6% belief it was out of carelessness and 24% confirmed it was as a results of hypoglycemia. 50.5% of the respondent could not manage their blood pressure properly with their age group being 51-60 years. It concluded that many people miss treatment due to forgetfulness, hypoglycemia and the complexity of the process involved in treatment.

LaSalle & Berria (2012) assessed Insulin Therapy in Type 2 Diabetes Mellitus: A Practical Approach for Primary Care Physicians and Other Health Care Professionals. The study concluded by suggesting that, there are several softwares available for tracking and monitoring of diabetes patients' condition which will help to take complete control over the situation and be able to determine the state of the illness at any given time since records are being taken to monitor each developments of the patient.

In summary, the issues of adherence to diabetic treatment recommendations remained a challenge to many diabetic patients due to factors such as age, education, knowledge, co-morbidity, gender, marital status, occupation among others. Considering the chronic nature of T2DM and its management, the study aimed at assessing patients' adherence to type-2 diabetes treatment recommendations. Notably; patient's adherence to dietary modifications, medications, exercise and accident prevention in the Peri-urban hospitals in the Kumasi metropolis of Ghana were assessed.

2. Materials and Methods

2.1. Research Design

This study deployed the positivists' research paradigm and a cross-sectional descriptive survey approach. This implies that quantitative research methodology was used. The survey technique was employed to sample portion of the diabetic patients within the study's catchment area and assessed their degree of adherence to drugs, diet restrictions, exercise and accident prevention after which inferences were made on the target population.

2.2. Population

The population of the study comprised of all diabetic patients who were seeking healthcare and regular reviews from the Peri-urban hospitals in the Kumasi metropolis of Ghana. The accessing population consisted of patients who had been diagnosed of type-2 diabetes mellitus for the past six (6) months. Patients with type-1 diabetes mellitus and diabetes insipidus were not included in this study.

2.3. Sample Size and Sampling Technique

Using appropriate statistical tools and technique proposed by Morgan and Krejcie (1970), a sample size of 200 were considered for the study. Stratified sampling technique was used to randomly select the respondents after stratifying them based on their education.

2.4. Data Collection Instruments

Structured questionnaire were the main instrument used in collecting primary data from participants. The questionnaires were subdivided into five sections. The first section comprised of the participants' demographic data, the remaining four sections dealt with their adherence with prescribed medications, exercise, dietary modifications and accident prevention.

2.5. Data Analysis

Statistical Package for Social Sciences version 23 was used in guiding data analysis. The study hypotheses were tested at 95% confidence intervals and p-value was considered statistically significant at the 0.05 level.

2.6. Ethical Considerations

All eligible participants were informed about the purpose and design of the study, as well as the voluntary nature of participation and withdrawal from the study at any time. They were also assured about confidentiality and anonymity of their responses. Participants who verbally consented further signed a written consent form to serve as evidence for their voluntary participation. Moreover, data collected were available only to the research team and stored in a locked filing cabinet in one of the researcher's office to be kept for at least five years.

3. Results and Discussions

Characteristics	Frequency n (%)
Gender	
Male	54(27.0)
Female	146(73.0)
Age	
Below 20	1(0.5)
21-30	6(3.0)
31-40	19(9.5)
41-50	39(19.5)
51-60	64(32.0)
60+	71(35.5)
Highest Educational Level	
Never	51(25.5)
JSS	37(18.5)
SSS	85(42.5)
Tertiary	27(13.5)
Marital Status	
Single	8(4.0)
Married	126(63.0)

Divorced	29(14.5)
Widow	37(18.5)
Main Occupation	
Informal	92(46.0)
Formal/Skilled	19(9.5)
Unemployed	56(28.0)
Others, specify	33(16.5)
Monthly Income (GH¢)	
<300	16(8.0)
300-399	18(9.0)
400-599	28(14.0)
600-799	23(11.5)
700-999	14(7.0)
1000+	101(5.5)
Religious affiliation	
Christian	177(88.5)
Muslim	20(10.0)
Other specify	3(1.5)

Table 1: Socio-demographic characteristics of respondents

As illustrated in table 1, 200 questionnaires were retrieved from all the participants giving a response rate of 100%. The survey results revealed 73% females and 27% males. This implies that females are more prone to diabetes than males. With regards to respondent's age, 32% were within the age group 51-60 years and 19.5% were within the age 41-50 years. Also, 9.5% were aged between 31-40 years, 3% were in age 21-30 while as 0.5% and 35.5% were below 20years and above 60 years respectively. It can be deduced from this that, the participants had wide variations in their ages. This explains the significant association between age and exercise and risk behaviour among the respondents. Education wise, 42.5% had completed Senior Secondary School, 13.5% have also completed Tertiary education and 18.5% have completed Junior High school meanwhile, 25.5% have never been to school before. Moreover, majority (63%) of the respondents were married, 18.5% were Widow, 14.5% were Divorced nevertheless merely 4% were single. With respect to Occupation, about one-third (46%) of the respondents were in the informal sector, 9.5% were in the formal sector and 16.5% in the other sector of the economy however, 28% were unemployed. In addition, 8% of the respondents received less than GH¢300.00 a month, 9% received income within GH¢300.00-399.00 and 14% received income within GH¢400.00-599.00. Another,

11.5% received income within GH¢600.00-799.00, moreover, 7% received an amount within GH¢700.00-799.00 a month meanwhile, 5.5% received GH¢1000.00 and above monthly. Religious wise, majority 88.5% were Christians, 10% on the other hand were Muslims notwithstanding merely 1.5% were other believers.

Variables	Adherence to Drugs		p-value	df	R	Adherence to Dietary Modifications		p-value	df	R
	Yes	No				Yes	No			
Gender										
Male	51	2	0.799	2	III	47	7	0.175	2	III
Female	137	4				134	9			
Age										
Below 20	1	-	0.998	10	III	1	-	0.943	10	III
21-30	6	-				6	-			
31-40	17	2				17	2			
41-50	34	4				34	4			
51-60	57	5				57	5			
60+	66	5				66	5			
Highest Educational Level										
Never	48	1	0.669	6	III	48	2	0.685	6	III
JSS	34	2				32	4			
SSS	82	2				75	9			
Tertiary	24	1				26	1			
Marital Status										
Single	7	1	0.169	6	III	7	1	0.744	6	III
Married	117	2				114	7			
Divorced	28	-				26	3			
Widow	34	3				33	4			
Main Occupation										
Informal	81	4	0.879	8	III	76	10	0.039	8	I
Formal skilled	18	-				16	2			
Unemployed	59	1				57	4			
Other	30	1				3	-			
Monthly Income										
300<	11	-	0.283	10	III	11	-	0.722	10	III
300-399	17	-				16	2			
400-599	26	-				26	1			
600-799	23	-				23	-			
700-999	12	2				12	2			
1000+	94	4				90	9			
Religious Affiliation										
Christian	166	6	0.894	4	III	160	15	0.083	4	II
Muslim	19	-				19	-			
Other	2	-				1	1			

Table 2: Association between Socio-demography, Adherence to Drugs & Dietary Modifications
df= degree of freedom, R=Remarks; where I=Significant, II=Partial Significant, III=Not Significant

The survey result showed an insignificant ($p\text{-value} > 0.05$) association between Adherence to drugs and respondents' socio-demographic characteristics such as gender, age, education, marital status, monthly income and religious affiliation. These imply that there are no major differences between adherence to drugs and behavioural tendencies/variations of the respondents such as age, gender, education, income, religion among others.

The association between Occupation and Dietary Restriction was significant ($p\text{-value} = 0.039 < 0.05$). This implies that the variations in the respondents occupation such as informal skills, formal skills, unemployed and other. It is therefore suggested that education on dietary restrictions should be intensified across employment gamut.

The association between Religious affiliation and Dietary Restriction is partially significant ($p\text{-value} < 0.10$). This implies that the relationship between Christians and Muslim may have influence on their dietary restrictions behaviours. It is therefore suggested that future public education should incorporate religious education. All other factors such as gender, education, marital status, income status had no statistically significant association with dietary restrictions.

Variables	Adherence to exercise		p-value	df	R	Accident prevention		p-value	df	R
	Yes	No				Yes	No			
Gender										
Male	44	9	0.540	2	III	53	1	0.721	1	III
Female	120	19				142	4			
Age										
Below 20	1	-	0.041	10	I	1	-	0.0316	5	I
21-30	6	-				5	1			
31-40	18	1				19	-			
41-50	25	12				38	1			
51-60	50	9				62	2			
60+	64	6				70	1			
Highest educational level										
Never	41	8	0.862	6	III	50	1	0.105	3	III
JSS	32	4				34	3			
SSS	68	12				84	1			
Tertiary	23	4				27	-			
Marital status										
Single	7	1	0.991	6	III	7	1	0.158	3	III
Married	100	18				120	4			
Divorced	24	4				29	-			
Widow	31	5				37	-			
Main occupation										
Informal	76	13	0.985	8	III	86	1	0.104	4	III
Formal skilled	15	3				18	1			
Unemployed	44	9				59	2			
Other	29	3				32	1			
Monthly income										
300<	10	1	0.370	10	III	10	1	0.522	5	III
300-399	12	5				18	-			
400-599	21	6				27	1			
600-799	23	-				23	-			
700-999	11	2				14	-			
1000+	83	13				99	2			
Religious affiliation										
Christian	146	25	0.250	4	III	173	4	0.740	2	III
Muslim	17	1				19	1			
Other	1	1				2	-			

Table 3: Association between Socio-demography and Adherence to Exercise and Accident Prevention
df= degree of freedom, R=Remarks; where I=Significant, II=Partial Significant, III=Not Significant

The study results showed that there was a significant ($p\text{-value} = 0.041 < 0.05$) association between Age and Adherence to exercise. This implies that the variation in the respondents age group affect their adherence to exercise significantly. This discovery warrants education and awareness across all age spectrums. The survey result further shows an insignificant ($p\text{-value} > 0.05$) association between Adherence to exercise and other socio-demographic characteristics such as gender, education, marital status, monthly income and religious affiliation.

Moreover, the association between Age and Accident prevention is significant ($p\text{-value} = 0.0316$) at 95% confidence interval. This implies that variations in respondent's age groups have influence on respondent's accident preventions behaviour. Education across all age group is required in this direction to counteract this behaviour.

Per-contra, the survey result showed an insignificant ($p\text{-value} > 0.05$) association between accident prevention and respondents' socio-demographic characteristics such as gender, education, marital status, monthly income and religious affiliation.

4. Conclusions and Recommendations

The main objective of this study was to assess diabetic patients' adherence to treatment recommendations. Specifically; the study focused on adherence to dietary modifications, exercise, accident prevention measures and prescribed medications.

There was a significant ($p\text{-value} = 0.041 < 0.05$) association between Age and Adherence to exercise; between Age and Accident prevention was significant ($p\text{-value} = 0.0316$); and also between Occupation and Dietary Restriction ($p\text{-value} = 0.985 > 0.05$).

This study adopted a cross sectional survey approach meanwhile longitudinal study would have been more insightful. It is recommended that future studies should consider a longitudinal study in order to better understand the behaviour tendencies of the respondents. Again, this study concentrated on Peri-Urban areas in the Ashanti Region. It is further recommended that future studies should look at typical rural and urban cases at different time periods.

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