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RESEARCH ARTICLE

PREVALENCE AND PREDICTORS OF NON-ADHERENCE TO DIET MODIFICATION AND FOLLOW UP CLINIC VISITS, AMONG ADULTS WITH TYPE 2 DIABETES MELLITUS IN A TERTIARY HOSPITAL IN ENUGU

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ABSTRACT

The study examined the prevalence of non adherence to diet modification, follow up clinic visits and the associated factors among type 2 diabetic adults at a tertiary hospital in Enugu State Nigeria. This descriptive cross-sectional study purposively enlisted 200 respondents who met the inclusion criteria. Data was collected using validated Researcher- developed questionnaire. Analysis used proportions and percentages for descriptive statistics and logistic regression for inferential statistics at 0.05 level of significance. Respondents' mean age was 60.1±10.6, 29% of the respondents ate less than 3 meals and without in between meal snacks in a given day while 63.5% ate irregularly. 24 hours dietary consumption recall showed that respondents selected food from all classes of food when planning their daily menu using locally available foods. 49.0% missed their clinic visits. Age was associated with non adherence to diet modification. Diabetics ≤ 50 years (p 0.046) were more non adherent than those ≥50years. Non adherence to diet was more among the married (87.4%), employed (67.7%) and those who have had diabetes for <4years (65.4%). Cost of transportation (*p* 0.000), discouraging attitudes of health workers (p 0.003) and late commencement of clinics (p 0.006) were associated with non adherence to follow-up clinic attendance. Screening patients for non adherence, improved time management, communication and patient- provider relationship may help achieve better client satisfaction with services.

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INTRODUCTION

Poor adherence to prescribed protocols of long term therapies is pervasive and costly problem of patients with chronic illnesses like diabetes mellitus (Fredrick *et al*, 2012). Poorer health outcomes, frequent hospitalisations and higher healthcare costs result when a patient does not adhere to recommended lifestyle changes such as diet modifications, taking medications and coming for clinic follow up visits (Eckland, 2013). Meanwhile adherence to prescribed lifestyle changes have been shown to improve glucose levels, to lead to decreased blood pressure and to correct lipid abnormalities which are associated with the micro and macro-vascular complications of diabetes (Adewale *et al*, 2013). Poor adherence to healthy lifestyle recommendations such as diet modification amongst type 2 diabetes mellitus patients has been found to be associated with the global urbanisation of communities (especially developing countries) with an increasing number of fast-food outlets serving unhealthy food (Adewale *et al*, 2013). Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both (Smeltzer *et al*, 2010; American Diabetes Association (ADA), 2013). DM is assuming epidemic proportions worldwide. Projected growth for sub-Saharan Africa was 98%, from 12.1 million in 2010 to 23.9 million in 2030 (Jean *et al*, 2010). Nigeria is reported to have up to 7% of its population as diabetics with Type 2 DM accounting for more than 90–95% (ADA, 2013). The risk of developing type 2 diabetes increases with age, obesity, history of pre diabetes, family history and lack of physical activity (ADA, 2013). Some of these risk factors are modifiable by self-care actions like taking drugs, self monitoring of blood glucose, regular exercise, adhering to dietary modification, going for follow up visits, foot and eye care.

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However, regimen adherence problems are common in individuals with diabetes, making glycemic control difficult to attain (Fredrick, 2012; Shankar *et al*, 2013). In literature, non adherence was found to be used interchangeably with non compliance (Jin, *et al* 2008). Non compliance was defined by North American Nursing Diagnosis Association (NANDA), 2012-2014) as a behaviour of a person and or caregiver that fails to coincide with a health-promoting therapeutic plan agreed upon by the person, family and/or community and healthcare professional (Carpenito, 2013). However, the term non compliance is sometimes regarded as a manifestation of irrational behaviour or willful failure to observe instructions. Non adherence has also been defined as "failure to adhere to a treatment plan or to follow a regimen in a consistent manner" (Smeltzer *et al*, 2010). It is further perceived as the extent to which a person's behaviour for taking medication, following diet, or executing lifestyle changes, coincides with medical advice (Wiznitzer, 2011; Kara *et al* 2007). In this study non adherence assumes that patients who are known diabetics, have been motivated through education, have gained confidence and are convinced about the benefits of their needed lifestyle changes and treatment but were prevented from adhering by some factors (Wiznitzer, 2011; Berman *et al* 2012) Therefore, non-adherence is preferred and has been chosen as a word to define this problem in this study (Wiznitzer, 2011)..

Non adherence to diet modification entails taking less than three meals daily without in between snacks, taking the meals at irregular times and not mixing food from all the classes of food during daily menu planning while non adherence to follow up clinic visit is not coming for booked appointments**.** Patients' reasons for their non-adherence to dietary recommendations include criticism by others, lack of information, unwillingness, lack of support from spouse and/or family, monotony of the diet, negative health beliefs and perceptions, previous experience with chronic disease and financial problems (Adewale *et al*, 2013). Other situational factors like eating out at restaurants, inappropriate food offers from others, not being able to do without favorite foods and junks and conflict caused by diet modification in the family may account for non adherence to regimen (Morisky, 2009). Psychological problems (depression and diabetes related-emotional distress), poor provider-patient relationship and long waiting hours before seeing healthcare provider can adversely influence the patient's ability to adhere to regimen especially coming for follow up clinic visits (Morisky, 2009; Barret *et al* 2007). Currently there is no known cure for diabetes but the major element in diabetes care is tight glycemic control which is achieved by strict adherence to medication, informed dietary modification, appropriate physical exercise, regular follow-up appointments and other instructions (Kalyango *et al* 2008).

Life style adherence problems have been reported among diabetics (Kalyango *et al* 2008; Huther *et al* 2013). Most of such reports were from developed countries while studies from developing countries majorly assessed non adherence to medication (Kalyango *et al* 2008; Ajibade *et al* 2010). In Enugu, there is paucity of information on studies assessing non adherence to diet modification and follow-up clinic visits among type 2 diabetic patients, the extent of the problem and factors that may be contributing to it. This underscores the need for this study to ascertain the prevalence of non adherence to diet modification and attending clinic visits among adults with type 2diabetes and to determine their associated factors.

The aims of this study were to (a) determine the prevalence of non adherence to diet modification and coming for clinic visits; (b) identify the demographic, psychosocial, and health system/regimen factors associated with non adherence to diet modification and coming for clinic visits.

MATERIALS AND METHODS

This descriptive cross-sectional study was done in an outpatient clinic of a tertiary hospital in Enugu State. The hospital has a high volume of diabetic patients, runs an outpatient diabetic clinic once every week and has in-patient facilities where medical care is provided throughout the year. The target study population was adults with type 2 diabetes that attended outpatient diabetic clinic. The monthly patient load for type 2 diabetics who attend follow up clinic visit once in a month was approximately 30, making up to 360 type 2 diabetics in one year. Sample size was determined using Taro Yamane formula for finite population and 200 participants who met inclusion criteria were purposively selected for the study. Inclusion criteria included having been diagnosed a type 2 diabetic, being up to 40years, coherent, alert and being available during the time of data collection between October and December 2010.

Data collection

Researchers' - designed and pre-tested questionnaire was the tool for data collection. The questionnaire consists of 11 items that elicited respondents' demographic variables; non adherence to diet modification and keeping clinic appointments and factors associated with non adherence. Ethical and administrative permit were obtained from the ethical committee of the Teaching Hospital, and the administrative authorities respectively prior to the study. The verbal consent of the respondents was solicited for and obtained. Anonymity was also maintained to enhance confidentiality.

Data analysis

Data collected were analyzed using a Statistical Software Package for Social Sciences (SPSS) version 15. Data proportions were computed for general description of study participants' profile and to obtain the prevalence of non adherence to diet modification and follow up clinic visit. Inferential statistics using logistic regression was performed to determine variables significantly associated with non adherence at 0.05 level of significance. Non adherence to diet modification entails taking less than three meals daily without the needed in between snacks and taking the meals at irregular times and not mixing food from all classes of food during daily meal planning. Non adherence to follow up clinic visit entailed patients not coming for appointments as booked. The independent variables included being married, cost of transportation, attitude of health workers, late commencement of clinic activities and age. Odd ratios, their 95% confidence intervals and p-values were also computed.

RESULTS

Respondents' characteristics

Their mean age was 60.1(S.D ± 10.7) years, while more than half 111 (55.5%) were above 60years of age. They were more

females (63.5%) than males (36.5%); few (29%) had no formal education, while majority (71%) had at least primary education. Most (88%) of the respondents were currently married. The mean duration with diabetes since diagnosis was 7.4years. Respondents were mostly self employed traders (39.5%) and (12%) farmers, while 63 (31.5%) were pensioners. Majority of the respondents (87.5%) were on oral hypoglycaemic agents (OHA), 13 (6.5%) were on combined OHA and injection insulin, while 12 (6%) were on injection insulin only as seen in Table 1.

Table 1. Demographic characteristics of respondents. (n=200)

Variables	Frequency	Percentage
Sex :males	73	%
Females	127	36.5
Age : ≤39	5	63.5
40 – 49	26	2.5
50 – 59	58	13.0
≥60	111	29.0
Level of education:		55.5
No formal education	58	
Primary	85	29.0
Secondary	21	42.5
Tertiary	36	10.5
Marital status:		18.0
Single	4	
Married	176	2.0
Divorced	5	88.0
Widowed	15	2.5
Duration of diabetes:		7.5
≤ 5years	70	
6 – 10years	79	35.0
≥ 11years	51	39.5
Occupation : Group		25.5
Self-employed	105	52.5
Farming	24	
Trading	79	12
Pastors	2	39.5
Employed in a salaried job	23	1.0
Hospital attendants	5	
Banking	2	2.5
Security men	2	1.0
Navy officer	1	1.0
Office clerk	3	0.5
Teaching	4	1.5
Administrative officers	6	2.0
Unemployed/retirees	72	3.0
		36
Pensioners	63	
Unemployed	9	31.5
Diabetes treatment options:		4.5
Injection insulin only	12	
Oral hypoglycaemic agent only	175	6.0
Injection and OHA combined	13	87.5 6.5

Prevalence of Non Adherence to Diet and Follow up Clinic Visit

Table 2 showed that 98(49.0%) of the respondents were not able to come for their follow up clinic visit as booked. 58 (29%) of the respondents ate less than 3 meals in a given day without the needed snacks and 127 (63.5%) of respondents did not have regular meal times. This means that these proportions of the respondents were eating less than 3 meals daily and the meals were eaten at irregular times. 24 hours dietary consumption recall showed that respondents selected foods for daily menu planning from the six classes of food using locally available foods. For breakfast in a given day, 39 (19.1%) of the respondents took pap, 37(18.1%) had bread, 13(6.5%) ate yam while 8(4%), 6(8%), 11(5.5%) and 15(7.5%) ate garri, pounded cassava, rice and plantain respectively all from starch. From protein (plant/animal) group 35(17.5%) had beans, 60(30%) took Bambara nuts (Okpa), 49 (24.5%) took Tea and Milk, 10(5%) and 21(10.5%) had meat and fish respectively in their soup.

Table 2. Prevalence of non adherence to diet and follow up clinic visits n=200

Diet	Frequency	Percentage %
Number of meals per day		
Eating ≥3times daily with needed	142	71
snacks=adherence	58	29
Eating ≤3times daily without snacks=non	73	36.5
adherence	127	63.5
Eating meals at regular times= adherence		
Eating meals at irregular times=non adherence		
Non adherence for coming for follow up:		
Able to come for follow up=adherence	102	51
Not able to come for follow up=non adherence	98	49

For their lunch in the same day, 31(15.5%) ate yam, 18(9%) took garri, 6(3%) had pounded cassava, 48(24%) ate wheat while 13(6.5%) and 14 (7%) ate rice and plantain respectively. From protein group, 38(19%) took Beans, 4(2%) ate pigeon peas (fio fio) while 13(6.5%) and 19(9.5%) had meat or fish in their soup respectively. 1(0.5%) ate yam and red oil while 3 (1.5%) ate Melon (Egusi) soup During supper, from starch group 32(16%) ate yam, 30(15%) ate garri, 13(6.5%) ate rice, 18(9%) plantain and 5(2.5%) foo foo , 51(15.5%) ate wheat. From protein group, 24 (12%) took beans and 8(4%) ate Bambara (Okpa), 16(8%), 23(11.5%) had meat and fish in their food respectively. 1 person (0.5%) also had yam with red oil. However only 10%, 4% and 2.5% took fruits for breakfast, lunch and supper respectively in a given day. Also 45(22.5%), 56(28%) and 99(49.5%) took vegetable with their meals for breakfast, lunch and supper respectively in the given day. This shows that fruits and vegetables were not adequately represented in the three main meals for the day. Garden egg is non calorie yielding fruit that should be consumed freely even as snacks however only 30(15%), 20(10%) and 7(3.5%) ate it in the given day.

Demographic factors associated with non adherence to diet and follow up visits: Logistic regression analysis (Table 3) showed that no demographic factors were statistically significantly associated with non adherence to clinic visits, though more females 65 (66.3%) than males (33.7%) could not keep their appointments for clinic visits, and people ≤ 50 years missed their clinic visits more than people ≥ 50 years. Age was found to be significantly associated with non adherence to diet (OR = 2.689, CI = 1.016-7.120, *p* 0.046). Respondents who were ≤ 50 years were more non adherent than those who were ≥50years.This shows that age of the respondents has impact on their adherence behaviour. Sex, level of education, marital status, occupation and duration with diabetes were not significantly associated with non adherence to diet though more females 81(63.8%) than males 46 (36.2%) were non adherent and being married 111 (87.4%) contributed more to non adherence than being single 16 (12.6%).

Psychosocial factors associated with non adherence to diet and follow up visit: Table 4 showed that cost of transportation (p 0.000 OR = 0.181, 95% CI =0.069- 0.472,) and no family member available to accompany respondents (*p* 0.024 OR = 0.088, 95% CI =0.011 - 0.723) were found to be significantly

associated with non adherence to clinic visits. No psychosocial factor was found to be significantly associated with non adherence to diet even though 64 (32%) of the respondents reported that being tempted by favorite foods/drinks were contributory to their non adherence to diet modification.

0.046, CI=0.006 –0.0353,) and late commencement of clinic activities (p 0.006, OR= 0.057, C I= 0.007 – 0.0448) were found to be significantly associated with non adherence to keeping clinic appointments as shown in Table 5.

Table 3. Association between demographic factors and non adherence to Coming for check up and diet (Logistic regression result)

Variable	Non adherence Yes (n,%)	No (n,%)	Odds Ratio	95% CI	P-value
Coming for check ups					
Sex: Male	33 (33.7%)	40 (39.2%)	1.400	0.768-2.552	0.272
Female	65 (66.3)	62 (60.8)			
Age: < 50years	83 (84.7)	86 (84.3)			
≥50years	15 (15.3)	16 (15.7)	1.071	0.476-2.409	0.868
Level Of Education:					
None Or Primary	71 (72.4)	72 (70.6)	0.928	0.487-1.771	0.822
Secondary or Tertiary	27 (27.6)	30 (29.4)			
Marital Status					
Single	11 (11.2)	13 (12.7)	1.137	0.476-2.718	0.772
Married	87 (88.8)	89 (87.3)			
Occupation					
Unemployed	34 (34.7)	30 (29.4)	0.772	0.409-1.459	0.426
Employed	64 (65.3)	72 (70.6)			
Diet	46 (36.2%)	27 (37.0%)	1.029	0.552-1.920	0.928
Sex: Male	81 (63.8)	46 (63.0)			
Female					
Age: < 50years	102 (80.3)	67 (91.8)	2.689	1.016- 7.120	0.046**
50years & above	25 (19.7)	6 (8.2)			
Level Of Education:					
None Or Primary	87 (68.5)	56 (76.7)	1.368	0.686- 2.728	0.374
Secondary or Tertiary	40 (31.5)	17 (23.3)			
Marital Status					
Single	16 (12.6)	8 (11.0)	0.835	0.333- 2.092	0.700
Married	111 (87.4)	65 (89.0)			
Occupation					
Unemployed	41 (32.3)	23 (31.5)	0.888	0.461- 1.713	0.724
Employed	86 (67.7)	50 (68.5)			
Duration with diabetes					
≤4yrs	44 (34.6)	26 (35.6)	1.123	0.600- 2.103	0.716
>4yrs	83 (65.4)	47 (64.4)			

**statistically significant

Table 4. Association between psychosocial factors and non adherence to diet and follow up clinic visit n=200

Variable Follow up clinic visit	Non adherence Yes (n,%)	No (n,%)	Odd ratio	95% CI	P-value
Distance is much	15 (7.5)	185(92.5)	0.519	0.144-1.868	0.315
Could not due to cost of transport	31(15.5)	169(84.5)	0.181	0.069-0.0472	0.000**
Nobody to accompany me	19(4.5)	191(95.5)	0.088	0.011-0.723	*0.024***
Diet					
Diet is costly	24(12.0)	176(88)	0.864	0.349-2.136	0.751
Tempted by favorite foods	64(32.0)	136(68)	0.907	0.481-1.713	0.764
Inappropriate food offer	20(10)	180(90)	0.764	0.274-2.134	0.608
No body to prepare the food on time	13(6.5)	187(93.5)	1.482	0.476-4.619	0.497

**statistically significant

Table 5. Association between health system/regimen factors and non adherence to diet and follow up clinic visit

Diet:					
Causing conflict in my home	6 (3.0)	194 (97.0)	0.618	0.096-3.961	0.611
Difficulty estimating desired quantity	12 (6.0)	188 (94.0)	2.021	0.578-7.070	0.271
Coming for follow up clinic visit:					
Attitude of health workers is discouraging	18(.9.0)	182 (91.0)	0.046	0.006-0.353	0.003**
Clinic activities are not commenced on time	15(7.5)	185 (92.5)	0.057	0.007-0.448	0.006**

** statistically significant

Health system/regimen related factors associated with non adherence to diet and follow up

No health system/regimen related factor was significantly associated with non adherence to diet modification however, discouraging attitude of the health workers (*p* 0.003 OR =

DISCUSSION

Majority of the respondents were females (63.5%) while 36.5% were males. Similar findings were reported in other studies (Kalyango *et al* 2008; Ajibade *et al* 2010). This may be explained by the fact that females have the tendency to report

illness more than men (Ajibade *et al* 2010). Moreover with advancement in technology and more women being exposed to environmental hazards and stress, they are prompted to focus greater attention on their health and health promotion practices (Smeltzer *et al* 2010). As a result some women are taking a greater interest in and responsibility for their own health care and also are exercising greater control over their health care options. Majority of the respondents (55.5%) were above 60 years of age. Type 2 diabetes typically develops in adults over the ages of 40years but it can appear earlier in younger adults mainly as a consequence of obesity (ADA, 2013). More than half of the respondents, (87.5%) were treated with only oral hypoglycemic agents (OHA) while only 6.5% were receiving OHA combined with insulin injection. Oral hypoglycemic agent has been found effective in treating patients who have type 2 diabetes that cannot be treated by diet and exercise alone (Smeltzer *et al* 2010). However during illness, infection, pregnancy, surgery or some other stressful events, patients with type 2diabetes may require injection insulin to control blood glucose level. 49% of the respondents in this study missed their hospital follow up visits. This agrees with other studies (Fredrick, *et al* 2012) who also recorded 28.3% non adherence to keeping hospital appointments in patients with diabetes. 29% of the respondents ate less than 3 meals in a given day and 63.5% of respondents did not have regular meal times. This can be attributed to the fact that their major occupations were trading and farming and respondents have the tendency to leave for their farms and markets in the morning, eat at irregular times until they get home in the evenings. This agrees with the non-adherence rate of 88% recorded in a study (Mumu *et al* 2014).

None of the demographic factors were found to be significantly associated with non adherence to coming for clinic visit in this study but non-adherents were more of the less educated, females, persons aged 50 years or below and the employed. Age was found to be significantly associated with non adherence to diet (OR = 2.689, CI = 1.016-7.120, *p* 0.046). Respondents who were ≤ 50 years were more non adherent than those who were ≥50years. This may be attributed to the fact that respondents within this age range may still be actively involved in their trading, farming and other jobs and tend to eat only when they have chance or when they return home. Adults generally tend to eat fewer meals in a given day due to reduction of rate of absorption with aging, reduced appetite, problem with dentition or non availability of family members to shop and cook for them. (Smeltzer *et al* 2010). Cost of transportation (P 0.000, C I 0.69 – 0.472 OR 0.181) showed significant association with non adherence to coming for clinic visits. This can be attributed to the location of permanent site of the hospital of study that is at the out skirt of the town. This makes patients within and outside the state to board buses more than once before getting to the hospital.

This agrees with other findings (John *et al* 2005; Enwere *et al* 2006) where economic constraints and poverty were barriers to adherence to attending clinic visits among type 2 diabetics in their studies. Non availability of family members to accompany respondents *(p* 0.024, CI 0.011–0.723, OR 0.088) was significantly associated with non adherence to coming for clinic visits. Most of the respondents (55.5%) were above 60 years; hence they may need the assistance of a second person in giving and receiving of information during health talks, consultations with physician, dietician and pharmacists. Older adults may experience confusion with complex tasks, thus patients who may need to take transport more than once before getting to the hospital may need assistance. Other findings (Ajibade *et al* 2010; John *et al* 2005) also reported that family conflicts, reduced family support/involvement were significant barriers to adherence in adults with type 2 diabetes in their studies. The discouraging attitude of health workers (*p* 0.003, CI 0.006–0.353, OR 0.046) and late commencement of clinic activities (*p* 0.006, CI 0.007–0.448, OR 0.057) were significantly associated with non adherence to coming for clinic visits.

Therapeutic patient-provider relationship enhances adherence thus where it is deficient, it can account for non adherence. Also delay in commencing clinic activities prolongs waiting hours and can lead to frustration and distress. This report supports that of (Rubin *et al* 2005; Delameter 2006) who stated that patients with type 2 diabetes who had better patient – provider relationship reported that they followed treatment recommendations and had good glucose control with less diabetes distress. (Morisky 2009) also identified support from healthcare professionals and patient satisfaction with the medical visit as major factors in improving and maintaining high levels of adherence to medical recommendations. (Delameter, 2006) reported that diabetic patients who were satisfied with their relationship with the health care providers had better adherence to diabetes regimen while those who rated their patient – provider communication as poor showed lower adherence rates to diabetes regimen.

Conclusion

Based on the results of this study, the following conclusions were drawn: there was non adherence to management regimen in adults with type 2 diabetes with respect to their prescribed diet and coming for clinic visit; the pattern of non adherence discovered ranges from the participants not taking up to 3 meals with added snacks in a day and not eating at regular times; age and was significantly associated with non adherence to diet while cost of transportation, lack of family member to accompany them, discouraging attitude of health workers and late commencement of clinic activities were significantly associated with non adherence to coming for check up visit.

Conflict Of Interest: The authors have not declared any conflict of interests.

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