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Contributory Factors to Diabetes Dietary Regimen Non Adherence in Adults with Diabetes

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***Abstract*—**A cross sectional survey design was used to collect data from 370 diabetic patients. Two instruments were used in obtaining data; in-depth interview guide and researchers' developed questionnaire. Fisher's exact test was used to investigate association between the identified factors and nonadherence. Factors identified were: socio-demographic factors such as: gender, age, marital status, educational level and occupation; psychosocial obstacles such as: non-affordability of prescribed diet, frustration due to the restriction, limited spousal support, feelings of deprivation, feeling that temptation is inevitable, difficulty in adhering in social gatherings and difficulty in revealing to host that one is diabetic; health care providers obstacles were: poor attitude of health workers, irregular diabetes education in clinics , limited number of nutrition education sessions/ inability of the patients to estimate the desired quantity of food, no reminder post cards or phone calls about upcoming patient appointments and delayed start of appointment / time wasting in clinics.

***Keywords*—**Behavior change, diabetes mellitus, dietary management, diet adherence.

I. Introduction

DIABETES mellitus is one of the chronic diseases that require long-term therapies and daily self-management. It is now regarded as a global epidemic and more than 230 million people worldwide are living with diabetes [1]. This number is expected to rise to a staggering 350 million (6.3% of the world population) within 20 years [1]. In United States, more than 13.8 million Americans have diabetes and Type 2 diabetes accounts for 90% to 95% of the diagnosed cases with 800,000 new cases reported each year [1]. In Australia, chronic diseases like diabetes now contribute to over 70% of the disease burden, and this is expected to increase to 80% by 2020 [2]. China with its large population of 1.3 billion has 30 million diabetic adults, while India has 35.5 million [2].

In Africa, the traditional rural communities still have low prevalence of 1-2% (except in specific high risk groups) while 1-13% or more adults in urban communities have diabetes. Nigeria has 7% of its population as diabetic [3], [4]. In view of the rate at which diabetes is now increasing, especially in developing countries, and with it's long and short term complications, there is urgent need for diabetic patients to adhere and maintain the American Diabetic Association's Clinical Practice recommendations of tight plasma glucose control of 80 – 120 mg/dl for fasting glucose measurement, eat as recommended, perform other self care activities, and go for check up as necessary [5]. Some studies [6], [7], [8] have recorded prevalence of non adherence to various aspects of diabetes treatment.

Diabetes is one of the chronic illnesses for which self-management plays a central role in care. To optimize their health, individuals with diabetes may be advised regarding diet and exercise, frequent medical examinations, annual specialized examinations of their eyes and feet, and, for many, prescribed multiple oral or injected medications every day. Until there is a cure for diabetes, these behaviors must be sustained for a lifetime [9]. Patients with diabetes need nutrition recommendations that are supported by scientific evidence and that can be easily understood and translated into everyday life. To achieve positive outcomes, a coordinated team effort that provides continued education and support is essential [10].

Adherence has been defined as the "active, voluntary, and collaborative involvement of the patient in a mutually acceptable course of behavior to produce a therapeutic result."[11]. Implicit in the concept of adherence is choice and mutuality in goal setting, treatment planning, and implementation of the regimen. Patients internalize treatment recommendations and then either adhere to these internal guidelines or do not adhere. Issues about adherence became a topic of considerable research by multidisciplinary teams beginning in the 1970s when studies showed that as many as 50% of patients diagnosed with hypertension were not taking sufficient amounts of their antihypertensive medications and that nonadherence was common particularly with long term treatments for conditions such as diabetes, asthma, hypertension and HIV/AIDS [12].

Regimen adherence problems are common in individuals with diabetes, making glycemic control difficult to attain. If diabetic management goals are to be achieved, all factors and circumstances that predispose or contribute to patients' nonadherence to regimen should be part of the health care givers' concern. This underscores the need to investigate the obstacles to non adherence to diabetes dietary regimen.

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II. Problem Statement

Diabetes is considered to be one of the most psychologically and behaviorally demanding of the chronic diseases [11]. It requires frequent self- care and lifestyle modifications, which principally includes dietary modifications [12], [13]. Studies have emphasized the importance of achieving optimal glucose control through strict adherence to diet and exercise in order to minimize serious long-term complications [14], [15]. These complications affect the patient's quality of life, increase mortality, morbidity and economic cost to society.

It is imperative that patients adhere to their prescribed regimens to minimize the burden of the disease on the health systems [13], [16].

Non-adherence in chronic diseases has been described as taking less than 80% of the prescribed treatment [11]. Previous studies have found adherence to diabetes treatment generally to be sub-optimal ranging from 23 to 77% [7], [11], [17], [18]. In addition, these studies have generated varied results of the factors associated with non-adherence to diabetes treatment. Most of the studies, however, were carried out in developed countries, leaving a gap in knowledge about the prevalence and factors that may be associated with adherence to diabetic treatment in Nigeria, a developing country.

In view of the need to prevent or delay the development of diabetes complications, the researchers reasoned that if diabetic patients would be empowered to manage their illness better, they need to be helped to identify and manage factors that contribute to non adherence to dietary regimen as compliance is a crucial component of chronic illness' self management. The obstacles associated with adherence in resource limited settings should be determined so as to lower the impact of a disease that is on the increase on the health systems, which are already overburdened with communicable diseases. Hence, the need for this study.

III. Objective of Study

The main objective of the study was to develop taxonomy of everyday situations that create obstacles for adherence to dietary management in patients with diabetes. The contributory objectives were: to determine associations between demographic characteristics and non-adherence; to determine association between psychosocial factors and non-adherence; to determine association between health care providers/organizational and non-adherence.

IV. Significance

Identifying factors in adherence will lead to finding more efficient and effective ways of enhancing patients' adherence. It will also help healthcare providers compare their perceived factors related to patients' live experiences thus enhancing patient/provider communication and better therapeutic relationship that aids adherence.

V. Materials and Methods

A cross sectional survey design was used for this study. The study was carried out between January and March 2010.

The area of study was UNTH, Ituku ozalla, located in the outskirts of Enugu city, along Enugu- PortHarcourt express road. UNTH is the largest referral and teaching hospital east of the Niger. It was founded in 1971. It operates out-patient diabetic clinic once every week and has in-patient facilities where medical care is provided throughout the week. Diabetic patients, self and non-self referred from Enugu and nearby states attend the clinic on appointment days.

The target population were all the diabetic patients that attended the out-patient diabetic clinic within the study period.

$$nf_{size} = \frac{no}{1 + \frac{no}{N}} \qquad no = \frac{Z^2(1-p)}{d^2}$$

The minimum sample size was calculated based on the Yaro Yamane's formula for sample size determination for estimating proportion in a finite population (Uzoagulu, 1998).

Where Z is the confidence interval, P is prevalence from previous study, d is the level of confidence, nf= minimum sample, and N=finite population.

The data available from the hospital records showed that the approximated number of diabetic patients that attended the clinic was estimated at 4,200 yearly. Using the formula, the sample size was estimated at 365, approximated, 370. Thus, 370 diabetic patients who met the inclusion criteria were recruited for the study. The sample included both Type 1 and Type 2 diabetic patients. The inclusion criteria included**:** participants who had been diagnosed as diabetic, should be 18 years and above, must be attending the clinic during the period of study, must be coherent, alert and willing to participate in the study through giving of informed consent. The exclusion criteria included**:** patients who were confused or too ill to communicate, those below 18 years of age, newly diagnosed patients (less than one month)

Two instruments were used in obtaining data; in-depth interview guide and researchers' developed questionnaire. Section A was used to elicit information on demographic data; section B contained open and close ended questions to elicit information on the situational factors that can affect dietary adherence.

The validity and reliability of the research instruments were tested. Experts in the field of nutrition and a consultant physician evaluated the relevance of the items in the research tools. The questionnaire was piloted among ten Type 2 diabetes patients selected from ESUT Teaching Hospital, Enugu. After the pilot testing, some question-items in the questionnaire were modified and reframed to ensure validity of the instrument, and facilitate patients' easy understanding when copies of questionnaire would be finally administered to the eligible patients.

A test re-test method of reliability testing was done and a co-efficient of reliability of 0.8 was computed using Pearson moment correlation coefficient formula.

Two research assistants were trained on the use of the instruments. Data were collected on each clinic day until the required number of respondents was reached. Those who could not speak or read English Language were assisted in filling the questionnaire by the researchers and the two assistants.

Ethical approval was obtained from UNTH Ethical Research Review Committee, Ituku Ozalla. The objectives of the study were explained to individual patients and voluntary informed consent of the patients was obtained. They were informed that personal information would not be disclosed to a third party. Patients were assured of their anonymity.

VI. Data Collection

The researchers and the trained interviewers used the pre-tested structured questionnaire to obtain information on patients' demographic characteristics and some situational factors to non-adherence to diabetes treatment. These included: socio-demographic factors such as: gender, age, marital status, educational level, religion, type of diabetes and occupation. The psychosocial obstacles identified were: non-affordability of prescribed diet, frustration due to the restriction, limited spousal support/family conflicts, feelings of helplessness/deprivation, feeling that temptation is inevitable, difficulty in adhering in social gatherings and difficulty in revealing to host that one is diabetic. The health care providers/organizational obstacles statistically associated with non-adherence were: poor attitude of health workers , irregular diabetes education in clinics, limited number of nutrition education sessions/ inability of the patients to estimate the desired quantity of food, no reminder post cards or phone calls about upcoming patient appointments and delayed start of appointment / time wasting in clinics. The 35-item questionnaire took an average of 30 minutes to fill and was administered to the respondents at the study site

VII. Method of Data Analysis

Descriptive statistics was used for general description of study participants and to evaluate the distribution of respondent's opinion, while Fisher's exact test was used to investigate association between the identified factors and nonadherence to diabetes dietary regimen. Odds ratios, their 95% confidence intervals and p-values were obtained. Level of significance was set at $p<0.05$. Data generated were analyzed using SPSS version 11.0 software

VIII. Results

Of the three hundred and seventy respondents, 170 (45.9%) were males, while 200 (54.1%) were females. The overall mean±SD age of the respondents was 50±13.8.

Majority, 344 (93.0%) were married while 26 (7.0%) were single. One hundred and forty-eight (40.0%) had primary education, 100 (27.0%) had secondary education; 85 (23.0%) had post secondary education and 37 (10.0%), had no formal education. The occupation section of the responses indicated that 130 (35.1%) were peasant farmers and traders, 56 (15.1%) were senior executives, and 140 (37.9%), were junior civil servants, whereas 44 (11.9%) were unemployed.

Three hundred and fifteen (85%) respondents had Type 2 diabetes against 55 (15%) that had Type 1 diabetes. The median duration with diabetes was 6 years (range 1 month to 40 years). Socio-demographic characteristics of the participants are shown in Table I.

TABLE I
Socio-Demographic Characteristics of Respondents

Characteristic	Variables	n (%)
Sex	Males	170 (45.9)
	Females	200 (54.1)
Age	18–50	192 (52.0)
	51–88	178 (48.0)
Marital status	Married	252 (68.1)
	Single	30 (8.1)
	Widowed	62 (16.8)
	Divorced	26 (7.0)
Education level	None	37 (10.0)
	Primary	148 (40.0)
	Secondary	100 (27.0)
	Tertiary	85 (23.0)
Religion	Catholic	175 (47.3)
	Protestant	123 (33.2)
	Muslim	2 (0.5)
	Others	70(18.9)
Occupation	Farmers/ Traders	130 (35.1)
	Senior executives	56 (15.1)
	Junior public servants	140 (37.9)
	Unemployed	44 (11.9)
Type of Diabetes	Type 1	55 (15)
	Type 2	315 (85)

TABLE II
ASSOCIATION BETWEEN DEMOGRAPHIC CHARACTERISTICS AND NON-ADHERENCE

Variables	Non adherence		Odds ratio	95% CI	p-value
	Yes n(%)	No n(%)			
Sex					
Male	146(85.9)	24(14.1)			
Females	29(14.5)	171(85.5)	35.87	20.00 – 64.35	<0.0001***
Age					
18 – 50	145(75.5)	47(24.5)			
51 – 89	43(24.2)	135(75.8)	9.686	6.02 – 15.58	<0.0001***
Marital Status					
Married	188(74.6)	64(24.4)			
Not married	56(47.5)	62(52.5)	3.252	2.05 – 5.15	<0.0001***
Educational Level					
None or primary	64(34.6)	121(65.4)			
Secondary or Tertiary	163(88.1)	22 (11.9)	0.071	0.04 – 0.12	<0.0001***
Occupation					
Unemployed	10(71.4)	4(28.6)			
Employed	220(67.5)	106(32.5)	4.447	2.26 – 8.74	<0.0001***

*** statistically significant

TABLE III
ASSOCIATION BETWEEN PSYCHOSOCIAL FACTORS AND NON-ADHERENCE

Variables	Non adherence		Odds ratio	95% CI	p-value
	Yes n(%)	No n(%)			
Cost affordability of prescribed diet					
All diet	32(8.6)	338(91.4)			
Some or none	309(83.4)	61(16.6)	0.02	0.012 – 0.29	<0.0001***
Frustration due to the restriction	326 (88.1)	44 (11.9)			
Coping well	45(12.2)	325(87.8)	53.51	34.4 – 83.4	<0.0001***
Limited spousal support	295 (79.7)	75(20)			
No family conflicts	39 (10.5)	331(89.5)	33.38	21.99 – 50.69	<0.0001***
Feelings of helplessness	280 (75.7)	90(24.3)			
Sense of well being	51(13.8)	319(86.2)	19.46	13.32 – 28.43	<0.0001***
Feeling of inconvenience	305 (82.4)	65(17.6)			
Less busy schedules	80 (21.6)	290 80(78.4)	1.29	0.90 – 1.86	0.1947[ns]
Feeling that temptation is Inevitable	43 (16.6)	98(26.5)			
No tempting situations	10(71.4)	327(83.4)	21.11	14.25 – 31.27	<0.0001***
Difficulty in adhering in social gatherings	277(75)	93(25)			
Gets along well in social situations	133 (36)	237(64)	5.31	3.87 – 7.29	<0.0001***
Difficulty in revealing to host that one is diabetic	327 (88.4)	43(11.6)			
Reveals status easily	29 (7.8)	341(92.2)	0.02	0.01 – 0.02	<0.0001***

*** statistically significant
ns – not significant

TABLE IV
ASSOCIATIONS BETWEEN HEALTH CARE PROVIDERS/ORGANIZATIONAL FACTORS AND NON-ADHERENCE

Variables	Non adherence		Odds ratio	95% CI	p-value
	Yes n(%)	No n(%)			
Poor attitude of health workers	276(74.6)	94(25.4)			
Satisfied with their relationship with their health care providers	28(7.6)	42(92.4)	3 35.86	22.85 - 56.30	<0.0001***
Irregular diabetes education in clinics	272 (73.5)	98 (26.5)			
Frequent diabetes education	4 (11.9)	326 (88.1)	20.56	13.92 -30.39	<0.0001***
Limited number of nutrition education sessions	314(84.8)	56(15.2)			
Inability of the patients to estimate the desired quantity of food	50(13.5)	20(86.5)	35.89	23.77 - 54.18	<0.0001***
Reminder post cards or phone calls about upcoming patient appointments					
Yes	26(7.6)	342(92.4)			
No	350(95)	20(5)	0.01	0.01 - 0.01	<0.0001***
Delayed start of appointments	322(87.0)	48(13.0)			
No time wasting in clinics	34(9.2)	336 (90.8)	66.29	41.63-105.6	<0.0001***

*** statistically significant

IX. DISCUSSION

Socio-demographic factors such as sex, age, marital status and occupation were identified to be significantly associated with adherence/non-adherence. This finding was same as some studies [6], [19], [20]. The result was dissimilar to that [21] found in another study among African Americans in which the men scored higher than women on self care adherence [22]. Other studies have not found any association between sex and non-adherence [17], [23],[24]. This could be due to the smaller number of participants (64 to 150 respondents) in these studies as compared to the current study (370). The proportions of the different sexes among participants are almost similar in all the studies done (ratio of about 1 male to two females) except in the one study[25] where 90.3% were females and 9.7% were males. The relationship between sex and non-adherence could be due to a difference between males and females on another characteristic that was not assessed in this study.

Some studies [22], [25] have found an association between age and non-adherence. As reported by Linda [21], socio-demographic variables such as age and gender appear to influence the degree of adherence to diabetes treatment regimen. The result however was different in that of [6] where age was not found a significant factor in adherence.

There was a statistical significance between educational level attained by the respondents and non-adherence. Similar discoveries were made at Joslin Center for Diabetes, Pittsburgh, Pennsylvania by [26]. The study showed that increased educational status promoted increased adherence to dietary recommendations

He opined that dietitians need to consider demographic characteristics to tailor education sessions and to focus on improving communication with patients to increase their understanding of diabetes. The finding of a relationship between non-adherence and education is similar to that found in another study done in Mexico [17]. Other socio-demographic factors that were statistically related to non-

compliance were, marital status and occupation, whereas religion and type of diabetes revealed no significant statistical association.

This study reported the influence of psychosocial factors in adherence to dietary regimen of diabetes. Such factors include: cost, frustration due to the restriction, limited spousal support and family conflicts, feelings of helplessness, feeling of inconvenience, unavoidable temptations, difficulty in adhering in social gathering, difficulty in revealing status to hosts of parties.

The findings of this study are in line with the studies that reported spontaneous activities [21], [27], as well as fear of being victimized en route to seeing a dietitian [28] among the commonly cited reasons for nonadherence in patients with Type 2 diabetes. Financial variables especially the direct and indirect costs associated with a prescribed regimen and restricted access to therapy have been found by several studies [22], [29] to influence patients' commitment to adherence in developing countries. The findings here are also in accordance with those of [30] who identified twelve types of psycho social problems in dietary compliance in diabetes management as : negative emotions, resisting temptation, eating out, feeling deprived, time pressure, tempted to relapse, planning, competing priorities, social events, family support, food refusal, and friends' support. Other psychosocial factors, including social support, diabetes-related distress, daily burden, and emotion-focused coping were also identified by [31]. The study by [32] also revealed a detrimental association of psychosocial factors with the adherence and prognosis of both Type 1 and Type 2 diabetes.

It is no wonder that diabetes distress is common. The importance of emotional issues in diabetes was first noted over 300 years ago in 1674 by Thomas Willis, a British physician [7]. Living with diabetes presents countless challenges ranging from the mundane to the monumental. The diabetes dietary care regimen is complex, generally unpleasant and unremitting, involving many impositions and restrictions. People who have diabetes frequently say they feel frustrated, fed up, overwhelmed or burned out by the demands of their disease. Polonsky and his associates [33] found that approximately 60 per cent of respondents in their studies reported at least one serious diabetes-related distress, and that this distress was associated with less active self-care and higher A1c levels and rates of diabetes complications. Frank psychological disorders, such as depression, are also a special problem for people with diabetes [34].

Diabetes is a family disease because it affects everyone who loves, lives with or cares for a person who has diabetes, and how all these people respond affects how the person with diabetes feels, and how that person takes care of his or her diabetes. Patients who feel unsupported or hassled say it is a major source of distress. Feeling unsupported or hassled by family and friends is yet another source of distress. Some patients feel that family and friends tempt them to ignore their diabetes or do not support their efforts to manage the disease (e.g. ‘Eat a little cake; a bite won’t hurt you’ or ‘Why do we always have to wait for dinner until after you test your blood?’). Others feel their family (and friends) go to the opposite extreme, monitoring and criticizing every action that could affect blood glucose levels (e.g. ‘You know that cookie is not on your diet; are you trying to kill yourself?’ or ‘You haven’t walked in weeks. You’ll never control your diabetes that way’). Some patients report that their family and friends fluctuate between providing too little support and harassing them. Both lack of support and criticism add stress to the life, of a person who has diabetes, often generating feelings of isolation, frustration, anger and guilt. This distress is a problem in its own right, and these feelings also can compromise self-care, physical well being and the quality of a person’s most important relationships.

The key to effectively treating diabetes-related distress is enhancing the patients coping skills. Approaches focus on helping patients either avoid stressful situations or helping patients manage stressful situations they cannot avoid, with many interventions focusing on both. The American Diabetes Association (ADA) has stated that psychosocial issues must be addressed by all diabetes education programmes it certifies [35]. A wide range of interventions, including therapy groups, self-help groups support groups etc., have been employed to promote more effective coping in children and adults with diabetes. The benefits of this psycho-educational programme are wide-ranging and robust. These studies reported benefits such as greater emotional well-being, enhanced coping skills, better regimen adherence and improved glycemic control [36], [22], [29] [37].

Associations between health care providers/organizational factors and non-adherence in this study revealed some obstacles such as: poor attitude of health workers, irregular diabetes education, limited number of nutrition education sessions, no reminder post cards or phone calls about upcoming appointments, delay start of appointments and time wasting in the clinics.). Importance of health education has also been found in other studies [6], [7], [11], [37]. In these studies, disease-related knowledge and skills may be lacking due to lack of adequate patient education, or patients may have inappropriate health beliefs and attitudes. Specific environmental barriers may adversely affect patients' ability to perform appropriate self-care. There is no question that diabetes management can be frustrating for health care providers, but it is important to be aware of how these attitudes may determine approaches to clinical practice and undermine effective diabetes management [38].

Although patients are responsible for their own decisions and self-care behaviors, patient outcomes are also affected by health care providers’ behaviors. To be most effective at health behavior change, health care providers should have a patient-centered approach, establish rapport, convey genuine interest in patients, cultivate a collaborative relationship, communicate clearly, and provide directives (advice) when patients are ready to hear and learn more about the new recommendations

[39],[40]. There is need to design strategies to help patients understand their dietary regimens in order to improve their adherence. This is to help prevent the complications of diabetes mellitus, which are debilitating and if not prevented can increase the burden of a disease that is already on the increase.

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