ORIGINAL ARTICLE

Family Functionality, Medication Adherence and Blood Glucose Control among Ambulatory Type 2 Diabetic Patients in a Nigerian Hospital

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ABSTRACT

Background: Family functionality is a patient-oriented medical and pharmaceutical outcome of care that is emerging in scientific literature. It is a family-related factor that influences positively or negatively medication adherence and glycaemic control yet it is not easily recognized by physicians and physician assistants. **Aim:** The study was aimed at determining the role of family functionality on medication adherence and glycaemic control among ambulatory type 2 diabetic patients in a Nigerian hospital. **Materials and Methods:** A clinic-based descriptive study was carried out on 120 type 2 diabetic Nigerians who were on treatment for at least three months at the primary care clinic of a tertiary hospital in Nigeria. Family functionality and medication adherence were assessed in the previous three months and one month preceding the study using General Functioning sub-scale of the Family Assessment Device(FAD) and interviewer-administered questionnaire on self-reported adherence to therapy(SAT) respectively. Glycaemic control was assessed in the previous one month. Family functionality referred to the perception of behavior of family members in relation to day to day diabetes care decisions and their psycho-physical interactions. **Results:** Healthy family function, medication adherence and glycaemic control rates were 90.8%, 72.5% and 61.7% respectively. Family functionality was significantly associated with household family (.048), medication adherence (p=.031) and glycaemic control (p=.022). **Conclusion:** Family functionality was significantly associated with household family, medication adherence and glycaemic control. Assessment of family functionality should be part of reason for encounter during consultation with diabetic patients in order to unravel family factors that can positively or negatively influence medication adherence and glycaemic control.

Key words: Nigerians, family functionality, glycaemic control, medication adherence, primary care

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INTRODUCTION

Diabetes mellitus is one of the ancient diseases known to man.[1] It is a lifelong health condition that requires self-care and affect the functional status, well-being and wellness of the victims and impact significantly on their health-related quality of life.[2,3] As a chronic metabolic disease requiring complex care, optimal care of diabetes entails functioning family system involving family members, friends and significant others.[4,5] Humans are social beings whose health is strongly influenced by socio-family environmental factors especially family interactions, communication, relationships and functionality.[6-8] Family has long been recognized as a natural unit of care in the society and its dynamism facilitates care process such as medication adherence among diabetic patients.[9-12] Family is defined in the context of the index patient as a group of individuals connected to a patient biologically, legally or by choice from whom the patient reasonably expect a measure of support in the form of food, shelter, finance and emotional nurturing sharing a past, a present and a future including all who contribute to the family culture.[13] Research studies have demonstrated that diabetes mellitus is a family disease[3,4,10,12,14] and that the health problems of the family are interlocking. In order to achieve positive effects of the family on diabetic care outcome, the family should be functional in meeting the demands of care for diabetic family members.[15,16] Numerous family factors have been reported to influence management of diabetes mellitus in ambulatory settings.[4,5,9,10,12,15,17] Among these factors is the level of family functioning. Family function is conceptually defined as the perception of behavior of family members in relation to day to day diabetes care decisions and their psycho-physical interactions.[15] Family function is therefore directly associated with the degree to which diabetic patient perceives how his or her needs in daily diabetic care are fulfilled by family members and is linked with cognitive-affective evaluation and physical interactions to the components of care services such as medication adherence and glycaemic control.[5,18,19] There is clinical and epidemiological evidence that family function can have either beneficial or harmful effects on diabetic outcome and socio-physical climate of the family has been linked with medication adherence and blood glucose control.[4,5,9,15,16,19] Several tools have been designed for the evaluation of family function at the point of care with each of the tool having varying degrees of complexities and psychometric properties.[8,20-22] Different scales have been used across and within various global populations and the perceived family functionality focused on peculiarities that characterized interpersonal interactions, relationships and communication. There exist McMaster Model of Family Functioning (MMFF)-Family Assessment Device(FAD).[20] Global Assessment of Relational Functioning(GARF);[21] Family Adaptability and Cohesion Evaluation Scale(FACES);[8] Family APGAR;[22] Family Functioning Index(FFI);[8] Family Functioning Questionnaire(FFQ);[8] and Family Environment Scale(FES).[8]

Globally, family functionality is a family health issue that is increasingly been recognized because of its association with a wide range of diabetic treatment outcomes.[11,12,15,17,18,23-26] In Nigerian Africa, there is dearth of research on the role of family functioning on medication adherence and glycaemic control among diabetic patients. Evaluation of the gap in the knowledge on family functioning of diabetic Nigerians is quintessential in unravelling the effects of healthy and unhealthy family functioning on medication adherence and glycaemic control. It is based on this premise that the authors were motivated to determine the role of family functioning on medication adherence and blood glucose control among ambulatory type 2 diabetic Nigerians in a tertiary hospital situated in a resource-poor environment of South-east Nigeria.

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MATERIALS AND METHODS

This was a clinic-based descriptive study conducted on one hundred and twenty adult type 2 diabetic Nigerians from April 2011 to December 2011 at the Department of Family Medicine of Federal Medical Centre, Umuahia, a tertiary hospital in Nigeria. Umuahia is the capital of Abia State, South-east Nigeria. Abia State is endowed with abundant mineral and agricultural resources with supply of professional, skilled, semi-skilled and unskilled manpower. Until recently, the capital City and its environ have witnessed an upsurge in the number of banks, hotels, schools, markets, industries, junk food restaurants in addition to the changing dietary and social lifestyles. The Department of Family Medicine serves as a primary care clinic within the tertiary hospital setting of the Medical Centre. All adult patients excluding those who need emergency health care services, paediatric patients and antenatal women are first seen at the Department of Family Medicine where diagnoses are made. Patients who need primary care are managed and followed up in the clinic while those who need other specialists care are referred to the respective core specialist clinics for further management.

The inclusion criteria were adult diabetic Nigerians aged ≥ 18 years who gave informed consent, had been on outpatient treatment for diabetes mellitus for at least 3 months in the Family Medicine clinic and had recorded at least two clinic visits (recruitment visit and end of study visit). This was to ensure that the study population was familiar with prescribed oral hypoglycaemic medications. The exclusion criteria included critically ill patients, diabetic patients living alone and diabetic patients who were on insulin therapy. Sample size estimation was determined using the formula[27] for estimating minimum sample size for descriptive studies and had been explained in detail in the previous publication by the authors.[28] Sample size of one hundred and twenty adult diabetic patients was used for the study. The eligible patients for the study were consecutively recruited for the study based on the inclusion criteria until the sample size of one hundred and twenty was achieved. The study tool consisted of sections on socio-demographic data, information on medication adherence, blood glucose control and family functionality. Medication adherence was assessed by the use of pretested, interviewer-administered questionnaire on 30 days self-administered and reported therapy (SAT).[28] Patients were seen at the recruitment visit, and at the end of the study visit. At the end of study visit, the adherence section of the data collection tool was administered. The information collected at the end of study visit included: (i). How many times per day do you take your blood glucose medication? (ii). How many tablets do you take specific to your diabetic condition? (iii). How often do you take your blood glucose medication (all-times, most-times, some-times, rarely, never). (iv). How many dose(s) of your anti-diabetic drugs have you missed in the previous one month? v. How many of your previous blood glucose medication is remaining after the previous one month visit? Adherence was graded using an ordinal scoring system of 0-4 points developed by the authors from the review of literature[28-32] as follows all-times=4 points, most-times=3 points, sometimes=2 points, rarely=1 point, never=0 point.

Family functionality was assessed in the previous three months using a 12-item General Functional sub-scale of McMaster Model of Family Functioning (MMFF)-Family Assessment Device (FAD).[20] The 12-item questionnaire tool consists of six positively worded items and 6 negatively worded items. Each item is scored on a 4-point Likert scale 1-4 as follows: Strongly agree=1; Agree=2; Disagree=3; Strongly disagree=4. Higher scores indicate worse levels of family functioning or problematic functioning. The final score was obtained by summing up the items scores and then divided by 12. In General Functioning sub-scales the final score of ≤ 2.0 meant healthy family functioning whilst score of >2.0 indicated unhealthy family functioning.

Pretesting of the family function tool and medication adherence section of the study instrument was done at the Family Medicine clinic of FMC Umuahia. Five diabetic patients were haphazardly used for the pre-testing of the family function tool and medication adherence questionnaire which lasted for one day. The pretesting was done to assess the applicability of the questionnaire tools. All the patients used for the pretesting of the questionnaire instrument gave valid and reliable responses confirming the clarity and applicability of the questionnaire tools and questions were interpreted with the same meaning as intended.

The baseline fasting blood glucose was recorded at the time of recruitment for each patient (recruitment visit) and subsequently at the end of study visit.[28] An adherent patient was defined as one who had a score of 4 points (took all the prescribed doses of anti-diabetic medication(s) all-times) in the previous 30 days by the end of the study visit while those that scored 0-3 points and missed a day dose of anti-diabetic medications meant non-adherence.[28] A patient was defined to have goal blood glucose control if his or her fasting blood glucose at the end of study visit was between 70 and 130 mg/dL.[28] Family functionality referred to the perception of behavior of family members in relation to day to day diabetes care decisions and their physical and psychological interactions. Household family referred to a number of persons eating from the same pot.[13]

The ethical clearance was obtained from Ethics Committee of the hospital. Consent was also obtained from the patients. The results generated were analyzed using software Statistical Package for Social Sciences (SPSS) version 13.0, Inc. Chicago, IL, USA for the calculation of percentages for categorical variables. Percentages and frequencies were compared by Chi-square. The level of statistical significance was set at $P<0.05$.

RESULTS

Of the one hundred and twenty diabetic patients who participated in the study, one hundred and nine (90.8%) had functional(healthy) family while eleven (9.2%) had dysfunctional(unhealthy) family functioning. On adherence to anti-diabetic medications, eighty-seven (72.5%) of the diabetic patients were adherent with medications while thirty-three (27.5%) of them were not adherent with medications whilst on blood glucose control seventy-four (61.7%) of the diabetic patients had their blood glucose controlled while forty-six (38.3%) of them were uncontrolled [Table 1]. Of the one hundred and twenty diabetic patients who participated in the study, one hundred and one (92.7%) of the study subjects from household family had functional (healthy) family functioning while eight (7.3%) of them from non-household family had functional(healthy) family functioning. Bivariate analysis of the demographic factors as related to family functionality showed that household family structure was statistically significant (x2=7.02; p=.048) while other demographic factors were not statistically significant. Diabetic patients from household family were seven times more likely to have functional family when compared with those from non-household family [Table 2]. Of the one hundred and twenty diabetic patients, eighty-two (94.3%) of them who had functional(healthy) family functioning were adherent with anti-diabetic medications while five (5.7%) of them who had dysfunctional(unhealthy) family were adherent with medications. The difference was statistically significant (X2=9.304; p=0.031). Diabetic patients from functional(healthy) family were nine times more likely to be adherent when compared with those from dysfunctional (unhealthy) family [Table 3]. Of the one hundred and twenty diabetic patients, seventy (94.6%) of them who had functional(healthy) family functioning had controlled blood glucose while four (5.4%) of them who had dysfunctional(unhealthy) family had controlled blood glucose. The difference was statistically significant (X2=12.633; p=0.022). Diabetic patients from functional(healthy) family were twelve and half times more likely to have controlled blood glucose when compared with those from dysfunctional (unhealthy) family [Table 4].

Table 1: Family functionality, medication adherence and glycaemic control among the study participants

Variables	Number	Percentage
Family functioning status		
Functional(healthy) Family	109	90.8
Dysfunctional(unhealthy)Family	11	9.2
Medication adherence		
Adherence	87	72.5
Non-adherence	33	27.5
Blood glucose control		
Controlled	74	61.7
Uncontrolled	46	38.3

Table 2: Association between demographic variables and family functionality of the study participants

Variables	Family functioning status		X^2	P-value
	Functional family Number(%)	Dysfunctional family Number(%)		
Age group(years)				
18-59	61(56.0)	5 (45.5)		
≥ 60	48 (44.0)	6 (54.5)	10.18	.109
Sex				
Male	35 (32.1)	10 (90.9)		
Female	74 (67.9)	1(9.1)	3.06	.072
Marital status				
Single	6 (5.5)	0 (0.0)		
Married	73 (67.0)	2 (18.2)		
Separated/divorced	3 (2.8)	1(9.1)		
Widowed	27 (24.7)	8 (72.7)	9.26	.860
Educational status				
Primary and less	26 (23.9)	2 (18.2)		
Secondary and more	83 (76.1)	9 (81.8)	6.601	.180
Type of marriage				
Monogamous	106(97.2)	5(45.5)		
Polygamous	3(2.8)	6(54.5)	11.300	.234
Family size				
1- 4	31(28.4)	2(18.2)		
>4	78(71.6)	9(81.2)	9.312	.173
Type of family				
Household family	101(92.7)	2(18.2)		
Non-household family	8(7.3)	9(81.8)	7.02	.048

Table 3: Association between family functionality and medication adherence among the study participants

Variable	Medication adherence status	
	Adherent Number(%)	Non-adherent Number(%)
Family functioning status		
Functional(healthy) family	82(94.3)	27(81.8)
Dysfunctional(Unhealthy) family	5(5.7)	6(18.2)

X^2=7.304; P=.031

DISCUSSION

One hundred and nine (90.8%) of the study participants had healthy family functioning and family functioning was significantly associated with medication adherence and blood glucose control. Although not every patient with healthy family function adhered to medication with good glycaemic control but their chances are higher when compared with those with unhealthy family function. The finding of this study is in consonance with the reports that healthy family functioning has beneficial effects on the care of diabetic patients whilst unhealthy family function has adverse effects on diabetic care and could affect adherence to medication, glycaemic control and other diverse

Table 4: Association between family functionality and blood glucose control among the study participants

Variable	Blood glucose control status	
	Controlled Number(%)	Not controlled Number(%)
Family functioning status		
Functional(healthy) family	70(94.6)	39(84.8)
Dysfunctional(unhealthy) family	4(5.4)	7(15.2)

X^2=12.633; P=.022

diabetic care.[5,9,10-12,15,19,24] Although evaluation of family functioning among diabetic patients is easy to be done in clinical practice but identification of potentially modifiable risk factors that are associated with dysfunctional family among the diabetic patients is of high clinical value during physician-patient encounter.[4,5,18,17] The implication of this finding is that physicians attending to diabetic patients with dysfunctional family may attribute lack of response to medication as therapeutic failure rather than absence of healthy family functioning. Absence of healthy family functioning for diabetic care can be used as a surrogate predictor of how well a diabetic patient would be able to cope with his or her disease and maintain long-term health and wellness states. Family functionality in the care of diabetic patients is therefore a suitable innovative and therapeutic tool in ambulatory care that provides appropriate psychosocial support necessary for improvement on medication adherence and blood glucose control.[23] The family members of the diabetic family should therefore be aware of this subtlety and made to actively participate in the care of diabetic family member especially in resource–poor environment where there are limited options for optimal diabetic care and healthy living.

Family functioning was significantly associated with household family structure. Diabetic patients from household family have higher family functioning when compared with those from non-household family. The higher family functioning among the diabetic patients from household family in this study could be a reflection of socio-centric type of family structure which is functional and predominant in Nigeria in which the family forms the epicenter of care activities and social support for diabetic patients.[2,10,13,14,33] This is in contrast to egocentric family which is more common in westernized societies.[13] In Nigeria, majority of diabetic patients live in household families and maintain traditional ties and roles. However, while it is likely that this traditional socio-centric family structure in Nigeria will prevail in the near future, there are visible signs of changes. More so, functional family discussion particularly that between the diabetic persons and other members of the household is critically important in ensuring optimal diabetic care particularly adherence to medication.[2,10,14,33] Physicians attending to diabetic patients should recognize the relevance of family functioning as an effective channel to improve medication adherence and blood glucose control. By exploring the functionality in the family unit, clinicians are likely to fulfil his obligations in attainment of blood glucose control to the recommended goal. Having a household member with diabetes can also provide opportunity for healthy behavior in non-diabetic household members and will address lack of knowledge on diabetic care.

This study has showcased that healthy family functioning was significantly associated with medication adherence. Adherent patients had lower family function scores than non-adherent patients thus corroborating the reports that enhancing family function among diabetic patients could improve medication adherence.[9,12,15,19,24] Unhealthy family functioning could lead to diminished self-care activities like medication non-adherence.[4,5] It is therefore not enough to prescribe antidiabetic medications during clinical encounter with diabetic patients but regular evaluation of family functioning should be a component of standard care for diabetic patients. Diabetic patients with family dysfunction should be offered appropriate family-oriented interventions to improve family functionality.

This study has shown the association between family functioning and blood glucose control. The finding of this study is in consonance with the reports that diabetic patients who have healthy family functioning are adherent to medication, have better blood glucose control when compared with those with unhealthy family functioning.[4,5,9,10-12,15,19,24] Healthy family functioning therefore impacts on medication adherence which is one of the leading factors for good blood glucose control resulting in substantial improvement in diabetes health-related quality of life. A functional family not only facilitate medication adherence amongst diabetic patients but also provide other sources of care to achieve blood glucose control to the recommended goal.[17,18,33] Being aware of this determinant of glycaemic control and evaluating them during subsequent diabetic patient visits can affect the quality of care delivered to these diabetic patients. This study therefore provides an evidence of the growing issue of the role of family functionality on glycaemic control as part of the search for an effective intervention to enhance blood glucose control. This study beckons for holistic care of diabetic patients with relative relevance given to family functionality through strengthening of the family functioning. A functional family not only facilitates medical adherence and glycaemic control but also contribute to the maintenance of family stability and homeostasis in illness, disease and healthy states.[6,23]

Study implications

Diabetes mellitus is a multi-dimensional disease that has implications for family and community health. Diabetic patient with dysfunctional family system are often encountered in the primary care setting in the study area and family dynamics is an integral component of factors that maintain optimum health in the management of diabetes mellitus especially in ambulatory care environment. Regular evaluation of family function can provide the clinician with additional information on diabetic patients at risk of non-adherence to medication and poor glycaemic control. It is therefore relevant to determine the role of family functionality on medication adherence and blood glucose control.

Study limitations

The study has some limitations. First and foremost, the sample for the study was drawn from Family Medicine clinic of the hospital. Hence, the findings of this study may not be general conclusions regarding diabetic patients attending medical outpatient clinics of the Department of Internal Medicine of the Hospital. Secondly, the limitations of using fasting plasma glucose to assess glycaemic control are also recognized by the authors. Admittedly, fasting plasma glucose is predictive of acute glycaemia and day to day variability of blood glucose and contributes to chronic glycaemia. However, local Nigerian studies[28,34,35] have shown strong, significant positive correlations of HbA1c and fasting plasma glucose among Nigerian diabetics implying that fasting plasma glucose could be a good useful surrogate marker for glycaemic control. However, this study gave some useful insight into the magnitude of the glycaemic control among the study population. Furthermore, the limitations imposed by the self-reported measure of adherence and family functionality for the study are recognized by the authors. Despite these limitations, the study provides valuable data that has relevant implications for family-oriented diabetic care.

CONCLUSION

Family functionality was significantly associated with household family, medication adherence and glycaemic control. Assessment of family functionality should be part of reason for encounter during clinical consultation with diabetic patients in order to unravel positive and negative family factors that can influence optimal care of diabetes in the family.

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