

## Association between Perceived Family Support and the Control of Adult Type 2 Diabetes Mellitus in a Nigerian Tertiary Hospital

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### ABSTRACT

**Objective:** To determine association between perceived family support and control of adult type 2 diabetes mellitus (T2DM).

**Method:** A cross-sectional study of patients with T2DM. Level of perceived family support was assessed with standardized Multidimensional Scale of perceived social support-Family scale. Fasting blood glucose (FBG) and glycosylated hemoglobin (HbA1C) were also analyzed. Pearson's and spearman rank correlation were used to determine the strength and the direction of the relationship. The level of statistical significance was set at  $p < 0.05$ .

**Results:** Of the 120 participants recruited, 107 participants completed the study and the mean age was  $56.9 \pm 10.9$  years while the mean FBG and HbA1C were  $123.06 \pm 32.30$ mg/dl and  $6.13 \pm 0.68\%$  respectively. Up to 87.9% of participants had good glycemic control. Participants with poor glycemic control was highest among patients with T2DM  $\geq 4$  years ( $p > 0.05$ ). Up to 57.0% of participants had high level of perceived family support. Age was significantly associated with high perceived family support ( $p < 0.01$ ). High perceived family support was significantly associated with good glycemic control ( $p < 0.01$ ). High level of perceived family support had direct correlation with FBG and HbA1C.

**Conclusion:** Participants with high-perceived family support had better glycemic control for T2DM. Physicians should involve family members in T2DM management.

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## Keywords

Fasting blood glucose, Glycaemic control, Glycated hemoglobin, Perceived family support.

## Abbreviations

FBG: Fasting Blood Glucose; HbA1C: Glycated Haemoglobin; SBGM: Self-Blood Glucose Monitoring; T2DM: Type 2 Diabetes Mellitus.

## Introduction

Diabetes mellitus is increasing due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity. Available data suggest that diabetes is emerging as a major health problem in Africa, including Nigeria [1-3]. These cause enormous human suffering and socioeconomic burden on these individuals, while placing a huge strain on the economy of their families [4]. It is a chronic disease that requires care within and outside the hospital. Management outside the hospital is vital to diabetic care as they are taught self-care behaviour [4]. This self-care practice is relevant in developing countries such as Nigeria where there is poverty and higher level of ignorance, which consequently leads to poor health care use as well as a higher patient-doctor ratio. Diabetic self-care requires that patients make daily decisions regarding their management in areas of dietary intake, physical activities adherence to medication, foot care, eye care and self-glucose monitoring with little assistance from health care professionals [5]. This may be a very difficult task when there is lack of motivation, emotional and financial support. In fact, many diabetics struggle with the loss of freedom in decision-making, particularly in food choices, as well as often perceiving deterioration in their quality of life [6]. It is of no surprise then that emotional, financial and motivational support play a major role in the management of diabetes [6]. People with diabetes mellitus have often been found to experience high levels of diabetes-related emotional distress as they manage their fluctuating blood – glucose levels, leading to poor self-management as a result of experiencing “diabetes burnout” [7]. Hence, despite the availability of multiple classes of medication, other effective therapies and the fact that effective glycaemic management reduces the risk of diabetes related complications, many patients with type 2 diabetes mellitus (T2DM) fail to attain or maintain glycaemic control overtime [4,8,9]. The institution where DM patients get such support is the family [10,11]. A healthy lifestyle is usually developed, maintained and changed within the family context. The World Health Organization (WHO) characterized the family as “the primary social agent in the promotion of health and well – being” [12]. A vast majority of health care costs is for management of chronic illnesses [13]. Self -management of chronic illness can help reduce cost, and close family members such as spouse and children play an important role in managing DM patients. Therefore, psychological or behavioral treatment that target the patient family member dyad may decrease health care cost and have more long lasting effects than treatment that target only patient [14].

Few studies have been conducted on the relationship between family support and glycaemic control with varied results [15-19]. Some of these studies showed that family support improves glycaemic control among people with DM [16,19] while another study reported no effect [18]. However, some of these studies were conducted in non-Nigerian population where family ties and values may not be highly rated [15,17-19,44]. Most of these studies did not assess perceived family support, which is a better predictor of health care outcomes [18,19]. Nevertheless, Osuji et al. in southwestern Nigeria studied the relationship between perceived family support and glycaemic control. The authors of Osuji et al. study reported that patients with high perceived family support had better glycaemic control [20]. To the best of knowledge of the authors, no study has been done in the study hospital on the relationship between perceived family support and the control of type 2 diabetes mellitus (T2DM) in adults. Good knowledge of a diabetic and extent of perceived family support from his/her family members will enable the physician individualize care for the patient.

This study therefore seeks to determine the association between perceived family support and the control of type 2 diabetes mellitus in adults attending the general outpatient clinic (GOPC) in a tertiary hospital in Nnewi, Nigeria.

## Methods

### Study Site

This study was conducted in the General outpatient clinic (GOPC) of NAUTH, Nnewi, Nigeria. The GOPC is one of the specialist clinics and serves as the first port of call for most patients coming to the hospital.

Consultants in family medicine, senior registrars, registrars, medical officers and nurses run the department. On the average, about 40 diabetic patients are seen per week in the GOPC. Apart from managing these patients, there are other support services, which include health education, which is usually given by nurses and dietician on each clinic day. Other support services at the hospital GOPC included the medical record department, pharmacy and social welfare services.

### Study design

This was a cross-sectional descriptive study.

### Study population

The study population comprised of all adults (40 years and above) with T2DM, who were attending the GOPC of Nnamdi Azikiwe University Teaching Hospital, Nnewi, south east Nigeria.

### Inclusion Criteria and Exclusion Criteria

All consenting adults with T2DM who were 40 years and above and in stable condition attending the General outpatient clinic for diabetic care were included in the study. Critically ill patients, pregnant diabetic women and those who took breakfast before coming were excluded from the study.

### Sample Size Determination

The sample size was determined using the formula for estimating the prevalence from a descriptive study:  $n = z^2pq/d$  [21]. A sample size of 97 was obtained with standard normal deviate  $z = 1.96$ . The prevalence rate used was 6.8% which was the prevalence rate determined among diabetics from a previous study in Port Harcourt, Nigeria [22]. The desired level of precision (d) was 0.05 and 10% of the original sample size was added to the sample size to make up for non-response taking the total number of subjects to be recruited to be 107.

### Sampling Method

Convenient sampling method was used as participants who met the inclusion criteria were recruited consecutively as they presented to GOPC until the sample size was attained. The case files of those selected at the end of each clinic were marked with numbered stickers to avoid duplication.

### Data collection

A pretested interviewer-administered validated questionnaire and a standardized questionnaire were used to collect information on sociodemographic characteristics and the level of perceived family support of the participant respectively. These questionnaires indicated their broad socio-demographic variables, blood glucose and levels of perceived family support. Perceived family support was the degree to which one perceives how one's need for support was fulfilled by family. Family support was assessed using 12-item multidimensional scale of perceived social support (MSPSS) from family, friends and significant others [23,24]. Each item was scored 1-7 as follows; very strongly disagree = 1, strongly disagree = 2, mildly disagree = 3, neutral = 4, mildly agree = 5, strongly agree = 6 and very strongly agree = 7. The scores were summated to arrive at a family support score. Possible range of scores was twelve 12 – 84. Higher scores indicated higher level of perceived family support. Scores 69 to 84 suggested strong family support; scores 49 - 68 suggested moderate support and scores 12 to 48 suggested low support. This categorization recognized the influence of family on diabetic care in sociocentric and household family setting in Nigeria [25,26]. Socio demographic data consisted of information on the age, sex, marital status, types of family, household size, educational level, religion and ethnic group.

Glycaemic control was assessed by measurements of glycated haemoglobin ( $HbA_{1c}$ ) levels. Three milliliters of venous blood were drawn from each participant into an EDTA bottle. The collected blood samples were sent to the laboratory in NAUTH, Nnewi for  $HbA_{1c}$  analysis within three to four hours using 2, 6 dimethyl phenol: 57.5% sulphuric acid method with the assistance of the laboratory scientist. Glycaemic control was categorized on the basis of the American Diabetes Association criteria as good glycaemic control (haemoglobin  $A_{1c}$  level < 7%) and poor glycaemic control (haemoglobin  $A_{1c}$  level  $\geq$  7%) [27].

### Ethical Clearance

Ethical clearance was obtained from the research and ethics committee of Nnamdi Azikiwe University Teaching Hospital

Nnewi, Nigeria. Consent was also obtained from the participants and they were adequately counseled before administering the validated questionnaire.

### Data Analysis

Statistical analysis of the data collected was done using statistical package for social sciences (SPSS) programme version 21.0 (Chicago Illinois). Results were presented in tables. Relevant means and standard deviations were calculated for quantitative variables, while categorical variables were presented in proportions. Pearson's and Spearman rank correlation were used to determine the strength and the direction of the relationship between  $HbA_{1c}$ , fasting blood sugar and social support score and family support score. A p-value of less than 0.05 at 95% confidence interval was considered statistically significant. The bivariate linear regression analysis was done to predict  $HbA_{1c}$  and FBG level using family support score.

### Results

A total of 120 type II DM patients were recruited for the study, out of which 13 (10.8%) of them had incomplete data and were removed during data entry. Hence, 107 (89.2%) completed the study. The data collected from them were analyzed and the findings presented below. Table 1 shows the sociodemographic characteristic of the study participant. Among which were 40 (37.4%) males and 67 (62.6%) females. The mean age of the patients was  $56.9 \pm 10.9$  years, while the predominant age group was 50-59 years (33.6%). Majority of them were married 55 (51.4%), while 27 (25.2%) were widowed, and the remainder were divorced 13 (12.1%) and single 12 (11.2%). Most of them were self-employed 33 (30.8%), farmers 25 (23.4%) and civil servants 23 (21.5%). Forty-nine (45.8%) of them had at least secondary education while 35 (32.7%) had primary education.

The mean fasting blood glucose (FBG) and  $HbA_{1c}$  was  $123.06 \pm 32.30$  mg/dl and  $6.13 \pm 0.68$  % respectively. The male patients had slightly higher mean fasting blood glucose and  $HbA_{1c}$   $123.25 \pm 35.21$  mg/dl and  $6.15 \pm 0.76$ % respectively than the females,  $122.94 \pm 30.71$  mg/dl and  $6.12 \pm 0.64$ % respectively as shown in table 2

Most of the patients 94 (87.9%) had good glycaemic control, while 13 (12.1%) of them had poor glycaemic control. Higher proportion of the male patients 7 (17.5%) had poor glycaemic control than the women 6 (9.0%) Table 3.

The proportion of patients with poor glycaemic control was highest among patients with DM 4 years and above 3 (15.0%), and least among patients with less than 1 year (9.1%). The median duration of diabetes mellitus for those with controlled diabetes and those with uncontrolled DM was 2 years respectively. A comparison of median difference in duration of DM between patients with controlled and those with uncontrolled DM showed no statistically significant difference ( $p=0.94$ ) as shown in table 4.

On the other hand, 61 (57.0%) of the patients had high perceived family support, while 21 (19.6%) of them had low perceived family support. A higher proportion of the females 41 (61.2%) than male 20 (50.0%) had high perceived family support as shown in table 5.

Patients who were male, aged  $\geq 70$  years, had tertiary education, married, retired or unemployed or housewife were more likely to have received high family support. However, it is only age that was significantly associated with high family support ( $\chi^2=16.36$ ,  $df=6$ ,  $p<0.01$ ) Table 6.

Fifty-nine (62.8%) of the patients with good glycemic control had high perceived family support compared to 15 (16.0%) of them with low perceived family support. Most of them with poor glycemic control 6 (46.2%) had low perceived family support compared to 2 (15.4%) with high family support. High perceived family support was found to be significantly associated with good glycemic control ( $\chi^2= 11.25$ ,  $p<0.01$ ) Table 7.

Correlation analysis was used to determine the relationship between total perceived family support score and fasting blood glucose and glycated haemoglobin levels. The results also indicated an inverse relationship between the total perceived family support score and fasting blood glucose, ( $r(107) = -0.55$ ,  $p< .001$ ), and glycated haemoglobin, ( $r(107) = -0.66$ ,  $p< .001$ ). This suggests that patients with high family support have lower levels of fasting blood glucose and glycated haemoglobin as shown in table 8.

**Table 1:** Socio-demographic Characteristics of the Patients.

Characteristic	Frequency (n=107)	Percentage (%)
<b>Sex</b>		
Male	40	37.4
Female	67	62.6
<b>Age (in years)</b>		
40-49	32	29.9
50-59	36	33.6
60-69	24	22.4
$\geq 70$	15	14.0
<b>Mean <math>\pm</math> SD</b>	<b>56.9 <math>\pm</math> 10.9</b>	
<b>Marital Status</b>		
Single	12	11.2
Married	55	51.4
Divorced	13	12.1
Widowed	27	25.2
<b>Occupation</b>		
Self employed	33	30.8
Farmer	25	23.4
Civil Servant	23	21.5
Retired	14	13.1
Unemployed	6	5.1
Housewife	6	5.1
<b>Educational Status</b>		
None	23	21.5
Primary	35	32.7
Secondary	19	17.8
Tertiary	30	28.0

**Table 2:** Mean Fasting Blood Glucose (FBG) and HbA1c level of the Patients by Sex.

Variable	Total Mean $\pm$ SD	Male Mean $\pm$ SD	Female Mean $\pm$ SD
FBG (mg/dl)	123.06 $\pm$ 32.30	123.25 $\pm$ 35.21	122.94 $\pm$ 30.71
HbA1c (%)	6.13 $\pm$ 0.68	6.15 $\pm$ 0.76	6.12 $\pm$ 0.64

**Table 3:** Distribution of DM Patients by Level of glycemic control and Sex.

Level of Glycemic Control	Total n=107 (%)	Male n=40 (%)	Female n=67 (%)
<7%	94 (87.9)	33 (82.5)	61 (91.0)
$\geq 7\%$	13 (12.1)	7 (17.5)	6 (9.0)

**Table 4:** Relationship between Glycemic Control and Duration of DM.

Duration of DM	Controlled DM (HbA1c <7%) N=94 (%)	Uncontrolled DM (HbA1c $\geq 7\%$ ) N=13 (%)	$\chi^2$ P value
<1	10 (90.9)	1 (9.1)	
1	23 (88.5)	3 (11.5)	
2	28 (87.5)	4 (12.5)	
3	16 (88.9)	2 (11.1)	
4+	17 (85.0)	3 (15.0)	
<b>Mean <math>\pm</math> SD</b>	<b>2.7 <math>\pm</math> 2.9</b>	<b>2.5 <math>\pm</math> 2.0</b>	0.28 0.99
<b>Median</b>	<b>2.0</b>	<b>2.0</b>	

**Table 5:** Classification of DM patients by the Level of perceived Family Support.

Level of family Support	Total n=107 (%)	Male n=40 (%)	Female n=67 (%)
High	61 (57.0)	20 (50.0)	41 (61.2)
Moderate	25 (23.4)	10 (25.0)	15 (22.4)
Low	21 (19.6)	10 (25.0)	11 (16.4)

**Table 6:** Relationship between Socio-demographic Characteristics and Level of perceived Family Support.

Characteristic	High n=61 (%)	Moderate n=25 (%)	Low n=21 (%)	$\chi^2$	P value
<b>Sex</b>					
Male	20 (50.0)	10 (25.0)	10 (25.0)	1.56	0.46
Female	41 (61.2)	15 (22.4)	11 (16.4)		
<b>Age (in years)</b>					
40-49	14 (43.8)	15 (46.9)	3 (9.4)		
50-59	23 (63.9)	4 (11.1)	9 (25.0)	16.36	<0.01
60-69	13 (54.2)	5 (20.8)	6 (25.0)	df=6	
$\geq 70$	11 (73.3)	1 (6.7)	3 (20.0)		
<b>Educational Status</b>					
None	10 (8.7)	5 (34.8)	8 (56.5)		
Primary	21 (60.0)	6 (17.1)	8 (22.9)	14.75	0.02
Secondary	7(36.8)	8 (42.1)	4 (21.1)		
Tertiary	23 (76.7)	6 (20.0)	1 (3.3)		
<b>Marital Status</b>					
Married	37 (67.3)	9 (16.4)	9 (16.4)	5.08	0.08
Not Married	24 (46.2)	16 (30.8)	12 (23.0)		
<b>Occupation</b>					
Self employed	20 (60.6)	15 (15.2)	8 (24.2)		
Civil Servant	15 (65.2)	7 (30.4)	1 (4.3)	16.17	0.04
Farmer	7 (28.0)	9 (36.0)	9 (36.0)	df= 8	
Retired	10 (71.4)	2 (14.3)	2 (14.3)		
Unemployed/ Housewife	9 (75.0)	2 (16.7)	1 (8.3)		

**Table 7:** Association between Level of Social Support and Glycemic Control.

Level of glycated Haemoglobin	Level of Social Support			$\chi^2$	P value
	High n=25 (%)	Moderate n=32 (%)	Low n=50 (%)		
<7%	24 (25.5)	32 (34.0)	38 (40.4)	12.56	0.002
≥7%	1 (7.7)	0 (0.0)	12 (92.3)		

  

Level of glycated Haemoglobin	Level of Family Support			$\chi^2$	P value
	High n=61 (%)	Moderate n=25 (%)	Low n=21 (%)		
<7%	59 (62.8)	20 (21.3)	15 (16.0)	11.25	<0.01
≥7%	2 (15.4)	5 (38.5)	6 (46.2)		

**Table 8:** Correlation between Total perceived family support score and Fasting Blood Glucose and glycated Haemoglobin level.

	Family Support Score	FBG	HbA1c
Family Support Score	-	-0.55 <sup>a**</sup>	-0.66 <sup>a**</sup>
Fasting Blood Glucose	-	-	0.89 <sup>b**</sup>
HbA1c	-	-	-

\*\*p<0.001

<sup>a</sup>Spearman Rank Correlation

<sup>b</sup>Pearson Correlation

## Discussion

The importance of tight blood glucose control in slowing or preventing the complications of diabetes has been identified by many studies [28,29]. Self-blood glucose monitoring (SBGM) is one of the key methods by which patients are encouraged to participate in their diabetic management plan.

This study estimated the proportion of patients with diabetes that achieved good glycaemic control. 94 (87.9%) had good glycaemic control. The reason for this high level of good glycaemic control may probably be continuous counseling of the participants on the need to adhere to diet, exercise and medical interventions as they attend hospital visits. Educational level of the subjects also may have played a role as it was also observed that 45.8% of the participants recruited in this study, had at least secondary education. Selection bias may have contributed. However, this is not in consistent with studies done by other authors both in Nigeria and internationally [30-35].

The age distribution of type2 DM shown by this study revealed that about 70% of the participants were at least 50 years of age. This is in keeping with other studies [16,37,43] in Nigeria which reported that type 2 DM occurs more in the elderly. Old age is known as a predisposing factor for the development of DM and other chronic diseases [16,36,37]. Therefore, it is important to lay emphasis on health education, lifestyle, dietary manipulation and screening of all individual 40 years and above for DM and other chronic illnesses.

Females were shown to have better glucose control in this study than males. The probable reasons for this are that women have

better health- seeking behavior than men and also adhere to health instructions and follow up. Women are also in contact to health facilities during their reproductive ages and are therefore more likely to be screened. However, there has been inconsistency on the influence of sex on glycaemic control. Some authors reported better control in female diabetic patients [20,38,39] while another study reported better control in the males. The reason for this variation was attributed to the very low socioeconomic status of the women in the study setting [40]. Considering these inconsistent findings on the influence of gender on glycaemic control, management should focus on improving the understanding of the disease by patient and family members and plans should go beyond sex differences.

This study also observed that the longer the duration of diabetes, the poorer the glycaemic control. As diabetes progresses, there is complete  $\beta$ - cell failure. This makes the response to diet alone or with oral glucose lowering agents (OGLA) unlikely to control the blood glucose. Secondly, prolonged use of insulin and OGLA leads to patient burnout phenomenon and thus, reduced adherence to diet and medication. Furthermore, with longer duration of illness, patients tend to seek for alternative/traditional methods of cure, abandoning their drugs and worsening their glycaemic control. Some exhibit burn out phenomenon and lose interest in taking their drugs on daily basis with no hope of getting a cure. Some other authors have also reported that the longer the duration of diabetes the poorer the glycaemic control [33,35].

More than half of the patients had high level of perceived family support. This was actually not surprising considering the Nigeria setting where family ties and values are still held at high esteem. Families usually pool their resources together to support their sick relatives. They also offer emotional support as well as being part of their diabetic self-management. This may have also contributed to high level of good glycaemic control observed in this study. Diabetics with high level of perceived family support usually have better compliance to dietary intervention, increased availability and adherence to medication and better acceptance and attitude towards diabetes [9-16]. Most of the patients used in this study are elderly and married and this may have also contributed to high level of perceived family support as it has been reported that the elderly and the married report better perception of family support [16,41]. High perceived family support was found to be significantly associated with good glycaemic control in this study (P<0.01). Correlation analysis also showed an inverse relationship between the total perceived family support score and fasting blood sugar ( $r(107) = -0.55, P<0.001$ ) and glycated haemoglobin ( $r(107) = -0.66, P<0.001$ ). This showed that diabetic patients with strong perceived family support had better glycaemic control based on fasting blood glucose and glycaemic control. However, Adejoh et al. did a study in Igala, North Central, Nigeria and reported that family support showed varied results [42]. This could be attributed to the traditional beliefs and values among the Igala people. They believed that every sickness has a traditional cure. Therefore, family members tend to encourage their diabetic relations to abandon orthodox medication to seek for help with herbal and traditional remedies [42].

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Good management of diabetes control should aim at maintaining blood glucose to as near normal as possible to help delay progression of long-term complications.

Continuous education program that emphasizes adherence on treatment regimens especially to diet, exercise and to regular follow up are of greater benefit in glycaemic control as compared to compliance of medication alone. Family and social support are essential in the holistic and long-term management of diabetes mellitus. Good management of diabetes control should aim at maintaining blood glucose to as near normal as possible to help delay progression of long-term complications.

### Limitations and strengths

Firstly, the study design being cross – sectional in nature limits conclusion on patients' blood glucose control over a longer period of time (greater than three months) and also cannot address the causal relationship between glycaemic control and factors found to be associated with it. Secondly, it is also a hospital-based study and findings may not be generalized to all patients with type2 diabetes mellitus and there may have been some level of selection bias during recruitment. Information on perceived family support were collected using a questionnaire and may be subjective and hence may not reflect the actual perception of family support. The strength of the study is that to the best of knowledge of the authors, no study has been done in the study hospital on the relationship between perceived family support and the control of T2DM in adults. Previous Nigerian studies were almost a decade old and updated data are needed. This is because good knowledge of a diabetic and extent of perceived family support from his/her family members will enable the physician individualizing care for the patient.

### Conclusion

The study showed that the study participants with high perceived family support had better glycaemic control among patients with type 2 diabetes mellitus. Therefore, physicians should involve family members in the management of diabetics.

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