

Effect of Educational Intervention Program on Self-Efficacy of Individuals with Type 2 Diabetes Mellitus in South-East, Nigeria

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ABSTRACT

OBJECTIVES: Diabetes Mellitus is a chronic disease, which requires a level of confidence among the sufferers in its management. This study investigated the effect of an educational intervention program on self-efficacy (SE) in diabetic individuals with type 2 diabetes mellitus in South-East, Nigeria.

METHODS: The study was a quasi-experimental controlled study, comprising 382 individuals with type 2DM selected, and assigned to intervention (IG) and control groups (CG). The instrument for data collection was the Stanford Chronic Disease Self-Efficacy Scale (SCDS). Pretest data were collected, and thereafter education on diabetes management was given to the IG group. The IG was followed up for 6 months. At the end of 6 months, post-test data were collected using the same instrument. Data were analyzed using Pearson Chi-square test statistics. A *P*-value less than .05 alpha level was considered significant.

RESULTS: There was no statistically significant difference between the two groups before intervention. However, after 6 months of intervention, a significant proportion of participants' scores in IG moved from low to either moderate, or high SE in almost all the SE domains (*P* < .05).

CONCLUSIONS: There was an improvement in most domains of self-efficacy in the intervention group after 6 months of educational intervention.

KEYWORDS: Type 2DM, self-efficacy, educational program, experimental or intervention group, control group, Nigeria

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Introduction

Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by a state of hyperglycemia over a prolonged period. It often results from several physical, environmental, social, and genetic etiology acting jointly.¹ There are 4 types of diabetes namely: type 1, type 2, gestational diabetes, and other types of DM.² Type 2 diabetes ranks as the commonest accounting for over 85% of the diabetic population.²

An increase in the prevalence of diabetes at global, regional, and national levels has been reported by previous studies.^{1,3,4} Globally, nearly half a billion adults were estimated to be living with diabetes.⁵ In Nigeria, the prevalence of DM was reported to be within the region of 8% to 10% with over 4 million cases.⁶ The prevalence of DM in the South East is 4.6%.⁷ The

disturbing increase in DM cases has made the World Health Organization (WHO) project that diabetes would be the seventh leading cause of death in 2030.⁸

In the management of DM, it is expected that individuals with diabetes are to exhibit a measure of confidence to be able to manage their condition to achieve glycemic control. This confidence in handling health-promoting tasks by individuals with DM is critical to the control and management of diabetes and could be achieved through patient education. Self-efficacy deals with people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives.⁹ A previous study has reported that an individual's perception of his/her ability to overcome the difficulties in a specific task will predict future attempts to



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engage in various behavioral challenges related to the task.¹⁰ It has also been noted that SE affects every area of human endeavor.¹¹ A diabetic person's belief regarding his or her power to affect situations might influence both the power a person has to face challenges competently and the choices a person is most likely to make. These effects are particularly apparent and compelling in behaviors affecting health.¹¹ In diabetes management, SE directly relates to how long someone will stick to a workout regimen. High or low SE determines whether or not someone will choose to take on a challenging task or write it off as impossible.¹² Self-care in diabetes condition is a challenging task because a person with diabetes has to learn how to manage his disease in general such as monitoring his blood glucose level and maintaining his diet of low carbohydrates, high fruits, and vegetables. He also has to be acquainted with giving himself insulin or taking oral hypoglycemic agents as well as be able to identify symptoms of hypo or hyperglycemia and know the right actions to take. He has to be involved in aerobic exercises, foot care, regular checkup for eye problems, monitor his blood pressure, do some house chores, and be able to manage or control depression associated with diabetes.

Diabetes education provides individuals with diabetes with the necessary information and skills needed to perform self-care, manage crises, and make lifestyle changes required to successfully manage the disease.¹³ This information and skills make the individual independent and self-confident in carrying out their self-care activities. This is important as the knowledge of self-care may help individuals develop strategies for the long-term management of diabetes. A previous study reported the importance of patient education for better outcomes of self-management of diabetes and suggested that patient education should be an integral component of high-quality diabetic care.¹⁴

Diabetes education programs emphasized the need for patients to have a practical understanding of approaches to self-care in diabetes and related conditions. A review of the literature showed a dearth of studies on the effect of an educational intervention program on SE of individuals with type 2 diabetes mellitus in South-East, Nigeria. This has created a knowledge gap that has challenged the current study to raise the research question, what is the effect of an educational intervention program on SE of individuals with type 2 diabetes mellitus in South-East, Nigeria? It is thereby hypothesized that there would be no statistically significant difference in the SE of type 2 diabetes after 6 months of educational intervention program when IG and CG are compared.

Methods

Three hundred and eight-two (382) persons with type 2 diabetes mellitus who access care from the outpatient diabetic clinic of 4 (4) tertiary health institutions in South East Nigeria were selected for the study. The participants were proportionately selected from the 4 tertiary health institutions and assigned to

IG and CG using a simple random technique. This was achieved by writing the number 1,2,3,4,5,6,7,8 on pieces of paper wrapped and put in a tray, odd numbers for the IG, and even numbers for the CG. Four boys, each representing a health institution were asked to pick a piece of paper from the tray after the tray was well shaken to ensure the papers had a good mix. Participants from institutions that picked odd numbers formed the IG, whereas participants from institutions that picked even numbers formed the CG participants. This was necessary to ensure control as well as the educational information does not filter to the control group participants. The IG group comprised 198 participants while the CG comprised 182 participants. Those eligible to participate were the DM patients who attended the diabetic clinics of the 4 tertiary hospitals selected for the study, between 40 and 60 years, and not less than 6 months of history of diabetes. The recruitment took 3 months to complete because the selected hospitals were located in different states. Research assistants (8) were trained, each from the 4 hospitals. Part of the training was making them understand the purpose of the research, and explaining their roles to them. Their roles were administering and collating the informed consent document and preparing the participants for educational intervention by the researchers.

Instrument for data collection: Data was collected using the Stanford Chronic Disease Self-Efficacy Scale (SCDSES) developed by Stanford Education Research Center (updated 2013).¹⁵ The instrument consists of 9 scales or domains with a total of 32 questions that assessed SE in chronic disease conditions. The score for each question item was graded by 1 (not at all confident) and 10 (totally confident) points. The score for each question is the score circled by the participant and the score for each scale is the mean of the items. A higher number indicates high SE; a lower number indicates low self-efficacy. In this study, however, SE was ranked as low, moderate, and high SE for each domain. The psychometric properties of SCDSES show that Cronbach's alpha was a minimum of .88 across all studies, minimal floor, and ceiling effects were observed, the measure was sensitive to change, and moderate and significant correlations provide convergent validity evidence when measured against selected health indicators.¹⁶

Ethical consideration: Ethical approval was obtained from the institutional ethics committee of the health institutions where the study was conducted. Informed consent was obtained from each participant. The participants were made to understand that the study is not associated with any hazard as the researchers were only interested in eliciting information from them on their SE in diabetes management. We also ensured that no personal or confidential information about the participants was divulged.

Procedure for data collection: The study participants were shared into groups for easy administration of the questionnaire. Each group was invited to the DM clinic of their hospital on a particular day for pre-intervention data collection. The

instrument was administered as a pretest to both intervention and control group participants. Thereafter, an educational intervention was commenced for the intervention group. The intervention group participants were taught how to manage their diseases such as foot care, blood sugar testing using a home blood glucose monitor, certain exercises, adequate diet for DM persons, BP monitoring, and recognition of signs/symptoms of DM. They were also encouraged to do some house chores as part of the exercise, get information from their healthcare provider, be involved in social recreation as well how to manage/control depression. The diabetic persons with better SE were identified during the pretest study and they served as models to those with very low SE for them to learn from the experiences of those with better SE. They were also encouraged to practice their self-care often to have mastery of self-care. The IG participants were followed up. A phone call was made between meetings to answer the participant's questions. During the period of intervention, the control group participants received normal care. Also, to enhance participants' interaction with the researchers a WhatsApp group was established, and the patients received a brochure. The WhatsApp group received motivational and instructive messages every day. Participants in the training phase had the opportunity to interact with 1 another, share knowledge, and ask questions to advance their experience and skills.

After 6 months of training/follow-up of the intervention group, copies of the questionnaire on self-efficacy were administered as a posttest to both the IG and CG. At the end of the post-test, data collation, the control group participants were educated, and the educational material was given to each of them as means of support. This was done to ensure that the control group gained from the educational intervention post-intervention as not doing so would have raised ethical concerns. Educational intervention material covered areas such as daily physical activity/exercise, adherence to diet therapy, daily blood glucose monitoring, general management of diabetes such as foot care, regular blood pressure monitoring, recognition of symptoms of hypo and hyperglycemia, and actions to take, eye checkups, health care use (even in the absence of symptoms), communication with physician, lifestyle changes, emotional, and stress management.

Method of data analysis: Data analysis was done using the Statistical Package for Social Sciences (SPSS) version 20. Data collected were summarized using frequency, and percentages. Pearson Chi-square test statistics were used to compare pre and post-intervention data on the self-efficacy of the intervention and control groups. Also, *t*-test statistic was used to compare the means of the intervention and the control groups. *P*-value less than .05 alpha levels were considered significant.

Results

The socio-demographic characteristics of the study participants were summarized in Table 1. The table shows that both

groups had similar proportions of participants across gender, marital status, and occupational status. The control group, however, had a significantly higher proportion of participants with better (tertiary) education ($\chi^2=13.684$, $P=.003$). The mean age of participants in the experimental group (58.52 ± 11.40) was similar to that of the control (56.29 ± 11.92) group ($t=1.87$, $P=.063$).

Table 2 shows participants in experimental and control groups were similarly spread across SE categories in practically all domains aside from the social recreation domain where the experimental group had significantly more individuals with low self-efficacy ($\chi^2=11.743$, $P=.003$).

Table 3 shows changes in the SE between experimental (Intervention) and control groups 6 months' post-intervention. Before the intervention, the result showed no statistically significant difference in the self-efficacy between the IG and CG except in the social recreation domain where the experimental (Intervention) group had significantly more individuals with low SE ($\chi^2=11.743$, $P=.003$). However, 6-month after the intervention, the result shows that a significant proportion of participants in IG showed a statistically significant different between the IG and CG in the following SE domains: regular exercise ($P=.001$), diet adherence ($P=.002$), obtain help from family/friends ($P=.047$), social recreation ($P=.009$), managing symptoms ($P=.001$), and control/managing depression ($P=.001$). Such a significant shift was not observed in the CG. On the other hand, no statistically significant different was observed in post-test scores between the IG and CG in the following SE domains: communication with physician, ability to manage disease in general, and ability to do chores.

Discussion

This study investigated the effect of an educational intervention program on the self-efficacy (SE) of individuals with type 2 diabetes mellitus in South-East, Nigeria. The comparison of the sociodemographic characteristics (Table 1) of the participants showed that the age, gender, marital status, and occupation of the IG and CG were not statistically significant different. However, the educational status of the 2 groups was statistically significant different ($P=.003$). However, the educational status of the 2 groups was statistically significant ($P<.003$). For the IG, most of the participants were females, married, secondary school certificate holders, and traders. In the CG, most of the participants were females, married, tertiary institution attendees, and traders.

The baseline scores before the educational intervention revealed low SE overall in exercise, chores, social recreation, and control depression domains of the SE measurement scale among the participants in the 2 groups. Comparing the subscale scores of SE of the 2 groups before the intervention, the result showed that the 2 groups were similarly spread across self-efficacy domains, but the intervention group had significantly more individuals with low SE in the social recreation

Table 1. Socio-demographic characteristics of study participants.

P-VALUE DEMO CHARACTERISTICS	GROUP		TOTAL (%)	χ^2	
	INTERVENTION	CONTROL			
	FREQ. (%)	FREQ. (%)			FREQ. N (%)
Gender					
Male	79 (39.9)	84 (45.7)	163 (42.7)	1.290	.256
Female	119 (60.1)	100 (54.3)	219 (57.3)		
Total	198 (51.8)	184 (48.2)	382 (100%)		
Marital status					
Single	17 (8.6)	16 (8.7)	33 (8.6)	1.410	.703
Married	152 (76.8)	133 (72.3)	285 (74.6)		
Widowed	27 (13.6)	32 (15.4)	59 (15.4)		
Divorced/Separated	2 (0.5)	3 (0.8)	5 (1.3)		
Total	198 (51.8)	184 (48.2)	382 (100)		
Educational status					
Primary	34 (17.2)	39 (21.2)	73 (19.1)	13.684	.003*
Secondary	100 (50.5)	59 (32.1)	159 (41.6)		
Tertiary	59 (29.8)	80 (43.5)	139 (36.4)		
No formal education	5 (2.5)	6 (3.3)	11 (2.9)		
Total	198 (51.8)	184 (48.2)	382 (100)		
Occupation					
Civil servant	35 (17.7)	46 (25.0)	81 (21.2)	3.607	.307
Trading	121 (61.1)	107 (58.2)	228 (59.7)		
Farming	2 (1.0)	1 (0.5)	3 (0.8)		
Retired	40 (20.2)	30 (16.3)	70 (18.3)		
Total	198 (51.8)	184 (48.2)	382 (100)		
Characteristic					
GROUP	N	MEAN	SD	T-TEST	P-VALUE
Age					
IG	198	58.52	11.40	1.866	.063
CG	184	56.29	11.92		

domain. The researchers attributed this to poor educational exposure (influence of education) of the intervention group since the control group had more participants with better (tertiary) education than the intervention group. No significant difference was observed between the 2 groups before intervention because the sample was chosen from the population which has had not received any educational intervention to enhance self-efficacy in the management of diabetes mellitus. This finding is similar to the previous findings that reveal no significant

difference observed in SE between the intervention and control groups before educational intervention ($P > .05$ respectively).^{17,18} Educational intervention in this study is meant to be adjunct management that will help the intervention group to acquire knowledge and skills in undertaking self-management to lessen dependence on medications.

In this study, it was revealed after 6 months post educational intervention that there was a statistically significant difference between the IG and CG in the domains of the SE such as the

Table 2. Comparison of self-efficacy between Intervention and control groups prior to intervention (Pretest).

RANK							
SELF-EFFICACY SCALE	GROUP	LOW (%)	MOD (%)	HIGH (%)	TOTAL (%)	χ^2	P
Exercise regularly	IG	71 (35.9)	94 (47.5)	33 (16.7)	198 (51.8)	0.261	.878
	CG	62 (33.7)	92 (50)	30 (16.3)	184 (48.2)		
	Total	133 (34.8)	186 (48.7)	63 (16.5)	382(100)		
Adherence to diet	IG	38 (19.2)	100 (50.5)	60 (30.3)	198 (51.8)	3.812	.149
	CG	30 (16.3)	111 (60.3)	43 (23.4)	184 (48.2)		
	Total	68 (17.8)	211 (55.2)	103 (27)	382 (100)		
Obtain help from family/friends	IG	20 (10.1)	110 (55.6)	68 (34.3)	198 (51.8)	3.607	.165
	CG	23 (12.5)	114 (62.6)	47 (25.5)	184 (48.2)		
	Total	43 (11.3)	224 (58.6)	115 (30.1)	382 (100)		
Communication with physician	IG	28 (14.1)	108 (54.5)	62 (31.3)	198 (51.8)	0.722	.697
	CG	21 (11.4)	101 (54.9)	62 (33.7)	184 (48.1)		
	Total	49 (12.8)	209 (54.7)	124 (32.5)	382 (100)		
Manage disease in general,	IG	39 (19.7)	131 (66.2)	28 (14.1)	198 (51.8)	3.544	.315
	CG	32 (17.4)	125 (67.9)	27 (14.7)	184 (48.1)		
	Total	71 (18.6)	256 (67.0)	55 (14.4)	382 (100)		
Do chores	IG	67 (33.8)	100 (50.5)	31 (15.7)	198 (51.8)	1.395	.498
	CG	52 (28.3)	100 (54.3)	32 (17.4)	184 (48.1)		
	Total	119 (31.2)	200 (52.4)	63 (16.5)	382(100)		
Social recreation	IG	71 (35.9)	90 (45.5)	37 (18.7)	198 (51.8)	11.743	.003*
	CG	38 (20.7)	111(60.3)	35 (19.0)	184 (48.2)		
	Total	109 (28.5)	201 (52.6)	72 (18.2)	382(100)		
Manage symptoms	IG	49 (24.7)	126 (63.6)	23 (11.6)	198 (51.8)	0.652	.722
	CG	42 (22.8)	124 (67.4)	18 (9.8)	184 (48.2)		
	Total	91 (23.8)	250 (65.5)	41 (10.7)	382 (100)		
Control/Manage depression	IG	59 (29.8)	119 (60.1)	20 (10.1)	198 (51.8)	1.986	.575
	CG	47(25.5)	116 (63.0)	21 (11.4)	184 (48.2)		
	Total	106 (27.7)	235 (61.5)	41 (10.7)	382(100)		

ability to exercise, adherence to diet, ability to obtain help from family/friends, social recreation, ability to manage symptoms, and depression. This outcome shows that educational intervention after 6 months of educational intervention improves the self-efficacy of the intervention group more than it does the control group. The participants who benefited from the educational intervention given by the researchers improved their abilities to exercise regularly, adhere to diet, obtain help, involve in social recreation, and manage symptoms and depression. This showed that the patients' self-efficacy which was low

before the study grew as they acquire more knowledge from the educational intervention. This finding agrees with the report of a previous study in which low levels of SE scores were observed at the pretest but markedly improved after educational intervention ($P < .001$).¹⁹ Also, a similar study showed that the mean self-efficacy scores of the intervention group, immediately, and 3 months after the intervention, significantly enhanced in all domains compared to the control group ($P < .001$, $P < .001$).¹⁸ A study in Turkey that applies the Stanford chronic disease self-efficacy scale to assess SE in the

Table 3. Comparison of changes in self-efficacy between the Intervention and Control groups of individuals with T2DM 6-months post intervention (Posttest).

POST TEST						
RANK						
VARIABLES	GRP	LOW (%)	MOD (%)	HIGH (%)	χ^2	P
Exercise regularly	IG	22 (11.1)	115 (58.1)	61 (30.1)	27.765	.001*
	CG	57 (31.0)	98 (53.3)	29 (15.8)		
	Total	79 (20.7)	213 (55.8)	90 (23.6)		
Adherence to diet	IG	15 (7.6)	96 (48.5)	87 (43.9)	12.829	.002*
	CG	22 (12)	113 (61.4)	49 (26.6)		
	Total	37 (9.7)	209 (61.4)	136 (35.6)		
Obtain help	IG	12 (6.1)	115 (58.10)	71 (35.9)	6.121	.047*
	CG	22 (12)	112 (60.9)	50 (27.2)		
	Total	34 (8.9)	227 (59.4)	121 (31.7)		
Communicate physician	IG	17 (8.6)	104 (52.5)	77 (38.9)	1.573	.456
	CG	21 (11.4)	101 (54.9)	62 (33.7)		
	Total	38 (9.9)	205 (53.7)	139 (36.4)		
Manage disease	IG	21 (10.6)	137 (69.2)	40 (20.2)	1.755	.416
	CG	26 (14.1)	128 (69.6)	30 (16.3)		
	Total	47 (12.3)	265 (69.4)	70 (18.3)		
Do chores	IG	36 (18.2)	116 (58.6)	46 (23.2)	3.611	.164
	CG	48 (26.1)	100 (54.3)	36 (19.6)		
	Total	84 (22)	216 (56.5)	82 (21.5)		
Social recreation	IG	47 (23.7)	90 (45.5)	58 (29.3)	11.505	.009*
	CG	36 (19.6)	112 (60.9)	36 (19.6)		
	Total	83 (21.7)	202 (52.9)	94 (24.6)		
Manage symptoms	IG	16 (8.1)	128 (64.6)	54 (27.3)	21.346	.001*
	CG	37 (20.1)	125 (67.9)	22 (12)		
	Total	53 (13.9)	253 (66.2)	76 (19.9)		
Control depression	IG	1 (0.5)	100 (50.5)	97 (49)	78.324	.001*
	CG	39 (21.2)	119 (64.7)	26 (14)		
	Total	40 (10.5)	219 (57.3)	123 (32.2)		

population they studied, showed significant improvement in diabetic self-efficacy after intervention ($P = .006$).¹⁷

The current finding portrays educational intervention for individuals with type 2DM and consequential improvement in self-management as a critical component of preventive care in people with diabetes.^{20,21} Interestingly, previous studies reported that intensive educational interventions providing self-management skills for people with diabetes have reduced blood glucose concentration in several studies.²²⁻²⁷ Increased

blood sugar predisposes individuals to complications but the current study has shown that with improved self-efficacy there could be a reduction in the rates of complications^{10,28, 29}. The non-improvement in the self-efficacy domain in CG justifies the need for the inclusion of educational intervention as an adjunct clinical intervention in the management of individuals with type 2DM. We, therefore, speculate that improvement in the self-efficacy of individuals with type 2 diabetes via an educational intervention program could be a

measure of confidence of individuals with type 2 diabetes to be able to manage their condition achieve glycemic control, and reduce intake of drugs.

Conclusion

Low SE was observed in a good number of participants in most domains of self-efficacy before intervention. Also, participants in IG and CG were similarly spread across most self-efficacy domains before intervention. However, 6 months after educational intervention, an improvement was observed in the IG as more participants had significantly fewer proportions of participants with low SE across most SE domains.

Contribution to Knowledge

A review of the literature showed a dearth of studies on the effect of an educational intervention program on SE in individuals with type 2 diabetes mellitus in South-East, Nigeria. This study has therefore shown that educational intervention programs in type 2 diabetic patients can improve the SE in the IG against the CG that there was no educational intervention. The outcome of the study has brought to the fore the need to integrate educational intervention programs in the management of type 2 diabetes to boost SE. This is imperative as in diabetes management, SE directly relates to how long someone will stick to a workout regimen. High or low SE determines whether or not someone will choose to take on a challenging task or write it off as impossible.¹⁴ Developing self-efficacy and mastering the skills in the management of diabetes will no doubt improve the patient's health status, curtail costs, and prevent the emergence of complications that are usually associated with diabetes. We, therefore, recommend that educational intervention programs should be included in diabetes care plans as an adjunct treatment measure and this requires collaboration among all critical stakeholders involved in diabetes management.

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Authors' Contributions

CNO, CCO, UPO, JOU involved in conceptualization—supporting, formal analysis—supporting, investigation—equal, project administration—equal, writing original draft—equal.

CCO, AVM, UEA involved in data curation—equal, formal analysis—lead, supervision—supporting, visualization—lead, writing, review, and editing—lead.

CCO, ENM, CNM involved in conceptualization—lead, formal analysis—lead, investigation—lead, project administration—lead, supervision—lead, writing, review, and editing—lead.

Ethics approval and consent to participate

The current study was performed by the relevant guidelines and regulations as contained in the Helsinki Declaration. Ethics approvals to carry out the research were obtained from the Institutional Ethics Committee of Nnamdi Azikiwe Teaching Hospital University, the University of Nigeria Teaching Hospital (NAUTHCS/66/VOL.10/2017/015), Federal Medical Center, Umuahia (FMC/QCH/G.596/Vol.10/238, the University of Nigeria Teaching Hospital (NHREC/05/01/2008B-FWA0002458-IRB0002323), and Federal Medical Centers Owerri (FMC/OW/HREC/172). Informed consent was obtained from each participant. Also, informed consent was obtained from the parent and legal guardians of the participants with no formal education.

Data Availability Statement

Upon reasonable request, data for this study can be made available by writing to the corresponding author.

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