

Effects of Self-Management Education Program on Knowledge, Self-Management Behaviors and Self-Efficacy in Type 2 Diabetes Mellitus Patients Having Poor Glycemic Control in Nepal

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Abstract— Introduction: Diabetic Mellitus has been known as chronic disease which has a very high incidence around the world. In Kathmandu, one of the biggest and capital City in Nepal, the incidence of Type 2 Diabetes Mellitus has been increasing year by year. **Objectives:** This Single Blind Randomized Controlled trial study design aim to examine a self-management education program on knowledge, self-management behavior and self-efficacy on patient with T2DM having poor glycemic control. **Methodology:** Sixty six patients meet the inclusion criteria were selected from the Diabetes Out-patient department of Alka Hospital, Kathmandu Nepal, after pair matching the subjects were equally divided in to two groups. The control group usual care as provided in the OPD by diabetes nurses, while the experimental group received one month diabetes self-management education program which followed the construct of self-management method on Kanfer and Gaelick-Buy's work (1991). The components of education program included a reflection on self-management behavior, education session regarding knowledge of DM, self-management education on diet, exercise, medication, management of complication, regular follow-up, individual goal settings and action planning and follow-up weekly at the 2nd week, 3rd week and 4th week. **Result:** The result of this study showed that subjects in the experimental group significantly improved their knowledge, self-management behaviors and self-efficacy after participant in the self-management education program. **Conclusion:** There was a statistically significant difference of knowledge, self-management behaviors, and self-efficacy between subjects in the experimental and control group. In this research only immediate outcomes were measured (self-management behavior, knowledge, and self-efficacy), therefore future research should consider with long-term outcomes that can be effect of educational program, such as self-management, self-care behavior, and glycemic control status. Three- month program to monitor HbA1c outcome can be measured for effective self-management behavior program.

Keywords- T2DM, knowledge, self-management behavior, self-efficacy, Nepal.

I. INTRODUCTION

Diabetes Mellitus [DM] is one of the serious health problems worldwide. DM is a metabolic disorder, which is characterised by high blood sugar, resulting from the impairment of insulin secretion, ineffective insulin action or combination of both conditions (14). The ADA classified DM into four types, including Type 1 diabetes, Type 2 diabetes (T2DM), Gestational diabetes, and other types of DM. In which, T2DM

is in the majority, which with approximately 90% - 95% of all diabetes patients (14). DM is one of the seventh leading causes of death in 2016 (1). The number of death due to diabetes was 1.6 million in 2012 and 2.2 million deaths in 2015 (1). Furthermore, DM is anticipated that the number of death will increase twice by 2030 (1). Likewise, 90% of DM population have Type 2 Diabetes Mellitus (T2DM) worldwide (15). In South East Asia, 88 million people, aged 20-79 were living with Diabetes Mellitus in 2019, it is predicted to increase by 115 million by 2030 and 153 million by 2045. 1 in 5 adults population with DM lives in South East Asain Region (15). In South-East-Asia the number of death due to diabetes were 1.2million and 57% people were still undiagnosed in 2019 (15). Similarly, Nepal is one of the six countries of IDF SEA region. The number of death due to diabetes were 11,697 of age 20-79 years in 2019, 69.5% population still remain undiagnosed in Nepal (15). A Study identified that glycemic control is one of the major factors that lead to the death and complication from DM (28).

Worldwide, the prevalence of poor glycemic control was relatively high as 60% (11), 70.9 % (9), 78.2% (6), 91.8 % (24). In low-middle-income countries, the prevalence of poor glycemic control had been increasing.

In Nepal, national statistics for glycemic control or complication of DM in patients with T2DM are not available. However, a study conducted on the out-patients department of Manmohan institute of Health Science Kathmandu, identified that 65.4% had poor glycemic control among 480 T2DM patients which were associated with duration of diabetes, a number of drug used, knowledge about diabetes, its complication and dyslipidemia (31). In Nepal, there are many factors related to poor glycemic control. However, modified significant factors regarding to the patients themselves that are lack of knowledge and poor self-management behaviors. Researcher conducted a preliminary study by interviewing ten patients. Six male and four females, aged between 38-72 years. The duration of patient having T2DM was from 1 to 18 years. Overall, the patients had poor knowledge, low self-management behaviors, and poor self-efficacy which led to the poor glycemic control. Moreover, based on interviewing, the poor self-management behaviors are related to the domain of poor diet control, medication non-adherence, in

appropriateness of symptom management, physical inactivity, monitoring blood sugar and follow-up.

A study identified that non-adherence to diabetic self-management behavior also lead to poor glycemic control (28). Diabetes self-management education and support (DSME) is an important key for management and control of DM. DSME helps patient to improve the knowledge, skills and abilities which facilitate in diabetes Self-care (13).

Recently, there are no study conducted about self-management and poor glycemic control among T2DM patients in Nepal; therefore, the study on the effects of self-management education program among the patients with T2DM not only filling the gaps of nursing and health care research in Nepal. This study aims to study the effects of self-management educational program on knowledge, self-management behaviors, and self-efficacy in T2DM patients having poor glycemic control in Nepal.

Hypothesis:

Hypothesis 1: After receiving a self-management education program, the patients will have a higher mean score of knowledge than before.

Hypothesis 2: The patients who receive a self-management education program will have a higher mean score of knowledge than those who receive a usual care.

Hypothesis 3: After receiving self-management education program, the patients will have a higher mean score of self-management behavior than before.

Hypothesis 4: The patients who receive self-management education program will have a higher mean score of self-management behavior than those who receive usual care.

Hypothesis 5: After receiving self-management education program, the patient will have higher mean score of self-efficacy than before.

Hypothesis 6: The patient who receive self-management education program will have a higher mean score of self-efficacy than those who receive a usual care.

II. METHODOLOGY

a. Study Design and Setting

In order to address the research's objectives, the Single Blinded Randomized Controlled trial study design, and the random sampling method were carried out in this study. The study was conducted at Kathmandu Diabetic and Thyroid Center, Alka Hospital, Jawalakhel, Patan, Nepal. In order to address the research's objectives, the Single Blinded Randomized Controlled trial study design. Two groups, pretest-posttest design used to evaluate the effects of Self-Management Education program on knowledge, Self-Management behavior and Self-efficacy among patient with T2DM having poor glycemic control. The participants were selected randomly divided into two groups: an intervention group and a control group. The intervention group received Self-Management education Program developed by the researcher and the control group received a usual care.

b. Sample Size

This study's total sample size is 33 participants per group. This includes 20% error margin.

c. Research Instrument

Demographic Data and Disease Information Questionnaire which is used for the age, gender, occupation, marital status, education level, height weight and some additional information about clinical manifestation as well as knowledge, self-management behaviors, and self-efficacy among patients with DM such as duration of diabetes, use oral medication or insulin injections or both. The research questionnaire included Diabetes knowledge questionnaire (DKQ-24) which was developed by (Garcia et al., 2001), Diabetes Self-Management Behavior Questionnaire (DSMBQ) developed by lin et al. (2008) and The T-DMSES developed by Sangruangake et al. (2017) to measure the self-efficacy of participants.

Instrument for Research Intervention

The self-management education program for patients with T2DM was adapted from Self-management theory Kanfer and Gaelick-Buy's work (1991) which covered both knowledge and self-management behavior. The material of education program in this study includes handbook of diabetes knowledge, poster of food pyramid, and plate method.

d. Quality of the Instrument

DKQ-24, SMBQ-20 and T-DMSES achieved internal consistency of Cronbach's alpha of 0.78, 0.94 and 0.89 respectively. The reliability of the SMBQ and T-DMSES were 0.75 and 0.86, respectively. Furthermore, the testing of the DKQ-24 was tested by using KR-20 (2) the validity of each element in the tool (21). The content validity index (CVI) result indicated 0.98 and was considered acceptable.

e. Data Collection

A simple random technique was used to select participants in Out-patient department of Kathmandu Diabetes and Thyroid Center. The pretest and post test data were collected from both the group. In order to prevent contamination between two groups, the data in the control group were collected before the intervention group. The pretest was conducted on second day in control group and fourth and fifth day in intervention group. The post test was conducted after 1 month of pretest among controls. Post-test among intervention group was conducted after educational intervention after 1 month follow up period.

f. Data Analysis

After cleaning up the data, the Epidata software 3.1 was used to enter data. Then, the data processed and analyzed by the Statistical Package for Social Sciences 20 (SPSS 20). The quantitative variables were summarized as mean \pm standard deviation or median, namely variables such as diabetes knowledge, SMBQ-20, and diabetes self-efficacy. Shapiro-Wilk was used to evaluate the assumptions of normality. The independent variables (diabetes knowledge, Self-management behavior and diabetes self-efficacy) were illustrated as normal distribution. Paired t-test or dependent sample t-test was used

to compare the different mean score of diabetes knowledge, self-management behavior and diabetes self-efficacy within the control and intervention groups.

Independent t-test or two sample t-test was conducted to compare the different mean score of diabetes knowledge, self-management behavior and diabetes self-efficacy between the control and intervention groups.

III. FINDINGS

A. Characteristic of the Participants

The demographic characteristics of the participants are illustrated in table 1. Male participants were relatively higher

with 57.6% and 54.5% of the participants in the intervention and control group respectively. The mean age of the participants was 55.83 years (SD = ± 11.49). Majority of the participants in both the group were retired followed by government job. Most of the participants were married in both groups with two-third of the participants having primary level education. About 24.2% of the participants in both the groups had T2DM within 5 years however majority of the participants on both groups had been diagnosed with T2DM between 5-10 years. Moreover, majority of the participants i.e. 84.8% on both the groups were on oral medication.

TABLE 1. Frequency and percentage of participants' characteristics

Variables		Experimental group (n)=33		Control group (n)=33		P-Value
		Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
Age	30-40	5	15.2	4	12.1	0.957
	41-50	10	30.3	11	33.3	
	51-60	6	18.2	8	24.2	
	61-70	11	33.3	9	27.3	
	71 and above	1	3.0	1	3.0	
Gender	Male	19	57.6	18	54.5	0.865
	Female	14	42.4	15	45.5	
Marital Status	Single	1	3.0	-	-	0.775
	Married	24	72.7	26	78.8	
	Widowed	8	24.2	7	21.2	
Occupation	Retired	14	42.4	13	39.4	0.865
	Business	1	3.0	4	12.1	
	Government job	6	18.2	6	18.2	
	Housewife	4	12.1	3	9.1	
	farmer	6	18.2	5	15.2	
	Others	2	6.1	2	6.1	
Education level	Primary	22	66.7	21	63.6	1.000
	Secondary	5	15.2	5	15.2	
	Bachelor	4	12.1	4	12.1	
	Masters	2	15.2	3	9.1	
Duration of diabetes	Less than 5 years	8	24.2	8	24.2	0.95
	5-10 years	16	48.5	17	51.6	
	More than 10 years	9	27.3	8	24.2	
Type of medications	Oral medications	28	84.8	28	84.8	1.00
	Insulin plus oral	5	15.2	5	15.2	

TABLE 2. Mean score and standard deviation of knowledge, self-management behavior and self-efficacy among the intervention group and the control group in pretest and post-test

Variable		Pre-test (n=33)	Post-test (n=33)	t	df	p-value
Knowledge	Intervention Group	26.36±6.15	33.18±0.58	-6.74	32	0.00
	Control Group	19.90±7.06	20.18±7.23	-0.03	32	0.76
	p value	0.00	0.00			
Self-management behavior	Intervention Group	36.06±5.74	71.57±1.39	-37.51	32	0.00
	Control Group	36.48±5.68	39.24±5.51	-3.71	32	0.003
	p value	0.76	0.00			
Self-efficacy	Intervention Group	47.90±7.09	91.09±2.55	-40.69	32	0.00
	Control Group	45.09±6.85	52.21±4.83	-5.91	32	0.00
	p value	0.10	0.00			
Diet	Intervention Group	16.33±3.53	39.84±1.34	-43.38	32	0.00
	Control Group	16.72±3.50	19.09±2.75	-3.16	32	0.003
	p value	0.65	0.00			
Monitor	Intervention Group	8.72±1.35	19.90±0.38	-47.34	32	0.00
	Control Group	10.96±1.89	11.66±0.91	-2.37	32	0.024
	p value	0.00	0.00			
Exercise	Intervention Group	11.30±0.84	17.72±0.94	-24.94	32	0.00
	Control Group	11.33±0.88	11.18±0.91	0.77	32	0.44
	p value	0.88	0.00			
Regimen	Intervention Group	9.48±1.83	13.60±0.70	-14.65	32	0.00
	Control Group	9.63±1.90	10.27±1.20	-2.012	32	0.053
	p value	0.74	0.00			

B. Knowledge, Self-Management Behavior and Self-Efficacy Score and Comparison

The mean score of knowledge, self-management behavior and self-efficacy between pretest and post-test was compared by using a paired sample t-test in both the intervention group and control group. The table 2 shows there was no significant statistically significant difference (at $\alpha = 0.05$) between the intervention and the control group in the pre-test. However, after the self-management education program the mean score of knowledge, self-management behavior, and self-efficacy between the control and intervention groups in post-test, the results showed statically significant increases in diabetes knowledge, diabetes self-management behavior and diabetes management self-efficacy in the intervention group. The control group reported no statistically significant changes at the level of 0.05 on diabetes knowledge, diabetes self-management behaviors, and diabetes management self-efficacy compared to the pretest of the same group too.

IV. DISCUSSION

Diabetes has been on increasing rate in the world and Nepal is no exception. Having some educational program can have a great impact on the knowledge of the diabetic patient so that they can help in diabetes management and glycemic control. The most of the participants in both groups were male, and the ratio between male and female was (26:10). This finding of this study was supported by the reviews done on the prevalence of type 2 diabetes found that the male patients with T2DM were higher double higher than female with T2DM (29, 18). The marital status of the main participants was married with 72.2% and 78.8% in the control and intervention group, respectively. This finding was support by the previous study conducted in a hospital based Cross-Sectional study half of the population were married had T2DM (31). In the term of level of education, the major participants were primary level (66.7%) in the control group and (63.6%) in the intervention group, which the STEP- Survey 2019 reported that over half of the participants were primary school and less than primary school (35).

In this study, the most participants had diagnosed from 5-10 year with mean duration of diabetes of 48.5% and 51.6% in the control and intervention groups. This finding was minor longer than the finding of the previous study which reported that a mean of duration of diabetes was 5 to years (3, 4). The principle of participants was treated with oral medication 84.8% and 84.8% in the control and intervention group, respectively. This finding was supported by previous study which reported that the most of patients with DM had treated with only oral medication 94.1% (5)

The major finding was that the intervention group had increased knowledge, self-management behavior and self-efficacy after the self-management education program. There was significant increase in the knowledge after the intervention among the intervention group which confirmed hypothesis 1 and 2. This result was comparable to the studies by (34,21,28,and10) which reported about progrssion of diabetes-specific knowledge after received the educational

intervention. The third and forth hypothesis of increased self management in the intervention groups after the intervention and compared to control group was confirmed in the study. Similar results were found on the (10) and (31). Hypothesis 5 and 6 stated the increase in the self-efficacy among the participants. In addition, the results of the study in the term of self-efficacy were confirmed by the psychological family intervention (6), the family-oriented program (7), diabetes educational program (30) which reported that the intervention group was statically significant increase self-efficacy over time. In conclusion, all aspects of the results in this study confirmed with hypotheses included effects of self-management education program based on the knowledge, self-management behavior and self-efficacy among patients with T2DM.

V. CONCLUSION

This study concluded that the self-management educational program based can clarify any self-management, increase knowledge, and motivate self-efficacy about DM. Hence, it is recommended that nurses take the self-management educational program to approach for discharge plan to the patients with DM for providing the proper self-management behavior, proper knowledge and the confident to take care them-self about DM, which are the indicators for glycemic control and protection from complications. Future research should be done with a larger number of participants to provide more quality of representation. Moreover, in this research only immediate outcomes were measured (self-management behavior, knowledge, and self-efficacy), therefore future research should consider with long-term outcomes that can be effect of educational program, such as self-management, self-care behavior, and glycemic control status. Three- month program to monitor HbA1c outcome can be measured for effective self-management behavior program.

ACKNOWLEDGEMENT

The authors would like to express gratitude to the Kathmandu Diabetes and Thyroid Center, Alka Hospital, Lalitpur, Nepal who had provided me an opportunity to do the study and to all the participants for their active participation in the study. Special thanks to Mr. Ganesh Bhandari for guidance during the study and Student Development Office and the Research and Training Center for Enhancing Quality of Life of Working-Aged People, Faculty of Nursing, Khon Kaen University for funding this research.

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