

RESEARCH ARTICLE

DIABETES SELF-MANAGEMENT EDUCATION PROGRAM (DSME) AMONG ADOLESCENTS WITH TYPE 1 DIABETES MELLITUS

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Abstract

The DSME program is aimed to educate adolescents about diabetes mellitus: disease process, survival skills, exercise management, drug management, diet management, prevent acute and chronic complications and optimize quality of life. This study utilized the quasi experimental pre and post-test design involving 15 adolescent patients with Type 1 Diabetes Mellitus. The DSME materials were composed of five modules that included topics in diabetes awareness, survival skills, exercise, drug and diet management. Knowledge, Fasting Blood Sugar (FBS), Random Blood Sugar (RBS) and waist and hip ratio (WHR) were tested. The Intervention phase was implemented in three months where each module was completed by patients in two weeks. Pre and post-test examinations were done after each module. Participants have very satisfactory knowledge in diabetes awareness, survival skills, exercise, drug management before and after the DSME program. However, participants knowledge in diet management were unsatisfactory before and after the DSME program. FBS were high but RBS levels and WHR were in normal levels before, during and after the DSME program. Knowledge scores were significantly different before and after the implementation of all the modules (Module 1 to Module 5) to the participants. RBS results were significantly different after the implementation of the Module 1- DM awareness and Module 5- diet management. However, no significant differences were obtained in the RBS results of the participants after the implementation of Module 2, 3, 4, and 5. No significant differences were also obtained in the WHR parameters of the participants in each of the implementation of DSME. No significant differences in the FBS results were obtained after the implementation of the DSME modules. The module type DSME is effective in increasing knowledge of the adolescent patients in diabetes and its management. The content of the diet management module needs to be strengthened and be tested again for its effectiveness in increasing knowledge of adolescent patients.

Keywords: Diabetes Management Self Education, Diabetes Type 1, Diabetes Mellitus

Introduction

Medical Guidelines for Clinical Practice for the Management of Diabetes Mellitus emphasized that diabetes is a worldwide epidemic that has created a crisis for the health care system and society (AAACE, 2015). For individuals born in 2000 the estimated risk for developing diabetes is 33% for males and 39% for females. The risk of death among individuals with Diabetes Mellitus is almost twice as that of individuals without diabetes of similar age. The world today is facing crisis where there is an estimated 200-300 million people with diabetes, and the number is still increasing. There are some 68 million people with diabetes in the Philippines and there will be more than 20 million (WHO, 2016). Fernando (2006) emphasized that a strong national awareness coupled with sincere (apolitical) prevention program is the only obvious answer

to the current dilemma. This study will contribute to the improvement of the condition of adolescent patients with diabetes. This will not prevent occurrences of diabetes but will prevent acute and chronic complications of diabetes mellitus. The use of the module approach in Diabetes Self-Management Education (DSME) program is one of the effective tools to optimize metabolic control, prevent acute and chronic complications and optimize quality of life.

The study on the level of awareness and extent of compliance of adolescent patients with Diabetes Mellitus (Urgel, 2014) has given this study basis on developing health teaching materials that would be necessary in DM management. Urgel (2014)

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showed that the level of awareness have a positive correlation in extent of compliance in DM management. Health education is necessary to increase compliance of adolescent patients to DM management. Health teaching materials that are age-specific and interactive are necessary to enhance diabetes self-management for an effective control of diabetes mellitus and prevention of its complications. Further, the study had come up with the age-specific and interactive module on diabetes management for the implementation of a diabetes self-management education program. The module approach in DSME program aimed to educate adolescents about diabetes mellitus disease process, survival skills, exercise management, drug management, diet management, prevent acute and chronic complications and optimize quality of life.

Furthermore, the module approach in DSME program is a cost-effective means of implementing diabetes self-management education to adolescent patients with Type 1 diabetes mellitus. It will also help to identify strength and weaknesses of the patient in the compliance of DM self-management to enhance their health-related behaviors and integrate it in their daily lives, with the purpose of achieving goal of optimal health care and independence in self-care.

Background

The study on the level of awareness and compliance of adolescent patients with Type 1 Diabetes Mellitus (Urgel, 2014) revealed that adolescent patients were aware on the importance of blood sugar control, signs and definition of hyperglycemia and with diet, exercise, and drug as part of the diabetes management. Patients have moderate awareness on symptoms of diabetes, signs of hypoglycemia, diabetes as a lifestyle related disease, obesity and family history as primary risk for diabetes. Patients who were compliant to diabetes management was "somewhat compliant" to drug, exercise and diet management. Further, there was a low correlation between diabetes level of awareness and compliance to DM management. It was concluded in the study that health education is necessary to increase the level of awareness and extent of compliance of patients in diabetes management. Level of awareness is important but adherence to diabetes management is of higher importance to prevent long term complications of DM.

Health education process that is more specific and appropriate to their needs can improve more the compliance of the patients to the diabetes management. The nurse's role is important in educating adolescent patients with Type-1 diabetes. As the result of the study, health education modules were created to increase the level of awareness and improve the compliance of adolescent patients to diabetes management. This study specifically aimed to determine the effectiveness of the health education modules.

The study aimed to educate adolescent patients with Type 1 diabetes mellitus in disease process, survival skills, exercise management, drug management and diet management, prevent acute and chronic complications and optimize quality of life. The

module approach in health teaching materials is a cost-effective tool in implementing DSME program among adolescent patients with Type 1 diabetes mellitus. The implementation of the module approach will empower patients in achieving optimum level of care and independent self-care. Furthermore, the results of the study will be beneficial to all diabetes clinics in the Philippines. The module approach health teaching materials will become an effective tool in the implementation of the DSME program for adolescent patients with diabetes mellitus.

Methods

Research Design

A quasi-experimental, pre and post-test design was used in this study. Beck and Polit (2010) explained that researcher using a quasi-experimental design looks much like experiments because it also involves manipulation of the independent variable. Researchers manipulate the independent variable by holding it from others.

Data were collected from adolescent patients with Type 1 diabetes mellitus that received module approach health teaching materials in the implementation of Diabetes Self-Management Education (DSME) program. These data were gathered from the patients before implementing health education program (pretest), during the implementation of the DSME program and again after its implementation (posttest).

Subjects of the Study

Because of the limitations of adolescent patients with type 1 diabetes mellitus, patients were identified based on referrals from Institute for Studies on Diabetes Foundation Incorporated (ISDFI) doctors, staff and patients. Thus, only 15 patients were qualified and included in the study. The subjects were recruited from the different cities of Metro Manila.

Fifteen (15) adolescent patients who were newly diagnosed of Type 1 diabetes mellitus and whose age ranges from 12 to 18 were included in the study. Patients are literate, able to read and write to qualify for the study. Literacy is needed for the module approach DSME.

The selected subjects underwent fasting for blood sugar test. Confirmation of diagnosis was given by a medical internist specialized in diabetes treatment and care. The patients with confirmed diagnosis of Type 1 diabetes and met the above criteria were chosen as the subjects of the study. These patients were assigned to the treatment group which received the module approach DSME program. However, no comparison group was included in the study. To ensure rigor of the study, outcomes were measured before and after each module.

Sampling Technique

A purposive sampling was utilized in this study wherein, the sample that was selected will become the representative of the

whole population. De Guzman et al. (2006) explained that in purposive sampling, the objects of the study in this particular sampling process has a unique characteristic, hence, not just anybody can be included as sample for the study.

The subjects were selected among the adolescents who were screened and diagnosed of type 1 diabetes mellitus. Patients must meet the above criteria to qualify for the study.

The following criteria of the subjects was established: 1) To determine diagnosis of patients with Type 1 diabetes mellitus risk factors like history of diabetes in the family, obesity, lifestyle factors and positive signs of diabetes mellitus was determined through the review of family records from the barangay health centers. Patients must be diagnosed of Type 1 diabetes by a medical internist specialized in diabetes treatment and care. 2) Underlying illnesses of patients including acute and chronic complications of type 1 diabetes mellitus was determined through the review of records and interview. The patients must have absence of other diseases or acute or chronic complications related to Type 1 diabetes mellitus to qualify for the study : 3) The patients must not be enrolled or engaged in any DSME program provided by different diabetic clinics, hospital and institution in the Philippines, and 4) Patients commitment to accept and accomplish the module was necessary. Patients understanding of the importance in completing the module of the study and the benefits it will give him were also emphasized.

Instrumentation

Intervention

The study used a module approach health teaching material in the implementation of the DSME program. The Health teaching materials was adopted from the result of the study of Urgel et al. (2014) on Level of Awareness and Compliance among Adolescent Patients with Type 1 Diabetes Mellitus.

The Health teaching materials was composed of five modules: Module 1- Module on Diabetes Awareness; Module 2- Module on Diabetes Survival Skills; Module 3- Module on Exercise Management; Module 4- Module on Drug Management; and Module 5- Module on Diet Management.

Module 1 discusses diabetes awareness. This includes discussion of information about diabetes mellitus, signs and symptoms of DM, and classifications of DM. Module 2 covers the diabetes survival skills. This includes the discussion of information about what to do in times of episodes of hyperglycemia and hypoglycemia attacks. Module 3 is all about exercise management. Module 4 includes the different drug management for type 1 diabetes mellitus. Lastly, Module 5 discusses the diet management.

A ten-item written examination was utilized as pre and post interventions to test the knowledge of the patients in diabetes and its management. The examination was comprised of questions

covering the five modules which included diabetes awareness, diabetes survival skills, exercise management, drug management and diet management.

A health assessment record was also used in the pre-screening process of patients and served as the record of the patient during the pre and post intervention phase of the DSME program. The health assessment record was adopted from the recent study Urgel et al. (2014). The data in the record was utilized in identifying certain parameters including glycemic control, physiologic status, lifestyle practices, and other factors that affect effectiveness of the module approach DSME program.

Assessment of glycemic control included Fasting Blood Sugar (FBS) test and Random Blood Sugar (RBS) test; Assessment of physiologic status included weight and blood pressure, Body Mass Index (BMI) and Waist to Hip Ratio (WHR); Assessment of lifestyle practices included physical activity and diet; and other factors that will affect effectiveness of DSME program included age, gender, educational attainment, underlying health conditions and previous diabetes education.

Instrument Validation

The health teaching materials and written examination were validated by four experts. These included two Diabetes Nurse Educators, who directly provides nursing care to DM adolescent patients, a school doctor and a school nutritionist.

The contents of the instruments were validated by 10 adolescent patients from the Institute of Diabetes Foundation Incorporated (ISDFI) Marikina City, who have the same criteria of the subjects of the study to find out if the questions were clearly understood, to illicit additional information, and to determine the length of time the questionnaire can be answered by the respondents. Moreover, those who participated in the content validation were excluded in the study.

The written examination was tested for reliability using test re test and Pearson's correlation statistics with the correlation results of ($r=0.80$, $p=0.00$) which means that the tool is highly reliable for use.

Internal Validation

To ensure internal validity of the data, feedback diary was included as part of the module to assess insights, experiences, strengths and difficulties encountered by patients while undergoing module approach DSME program. This helped determine problems encountered by patients during each implementation of the module.

Data Gathering Procedure

The data gathering procedure is explained in figure 2. Data Gathering Procedure started with the pre-screening process of the subjects through review of patient's family records from

Institute for Studies on Diabetes Foundation Incorporated (ISDFI), conduct fasting blood sugar test and confirmation of diagnosis from a doctor who specialized in diabetes treatment. Patients were oriented about the module approach DSME program before they were subjected to it and how to use the module effectively. The data gathering procedure included three phases. It included the pre-intervention phase, intervention phase and the post-intervention phase. Pre and Post-tests were given to the patients to determine differences of outcomes in the module approach DSME program. Patients received 4 pre and post- tests during the intervention phase after each implementation of the module.

Intervention phase was implemented in three months where each module was completed by patients in two weeks. Post-intervention phase was performed after the completion of the 3 months intervention phase.

The data gathering in this study was done in the following process:

Phase 1- Pre-Intervention phase

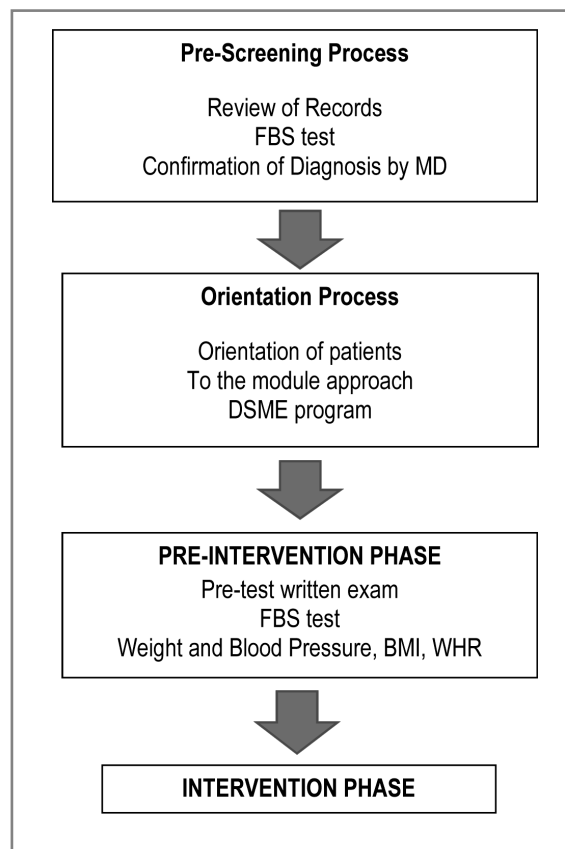
The Pre- Intervention phase is described as the stage before the implementation of the module approach DSME program. Pre-test examinations were given to patients before the implementation of each module. The following parameters were identified and assessed to determine the level of knowledge of subjects to DM and DM triad management, glycemic control, physiologic status and lifestyle practices. The following parameters were assessed; 1) Pre-intervention level of knowledge of adolescent patients on diabetes mellitus and DM management. This parameter was assessed by conducting the pre-intervention written examination to patients, 2) Pre- intervention glycemic control was assessed as another parameter for the effectiveness of DSME. The parameter was assessed by conducting FBS test to patients, 3) Physiologic status were assessed using the following parameters that included weight and blood pressure, Body Mass Index (BMI) and Waist to Hip Ratio (WHR).

Phase II- Intervention Phase

The intervention phase is described as the implementation of the module approach health teaching materials. A module approach in health teaching materials was implemented as a tool in the implementation of the DSME program to adolescent patients diagnosed of type 1 diabetes mellitus.

Intervention phase was implemented in three months where each module was completed by patients in two weeks. Patients were asked to complete each module in 2 weeks. After each module, pre and post-test examinations were done.

Post-test was given to determine differences of outcomes in the module approach DSME program. Post-test included post-written examination, assessment of weight, blood pressure, body mass index, waist and hip ratio and Random Blood Sugar test



and fasting blood sugar test to assess effectiveness of DSME program. Random blood sugar and fasting blood sugar is an indicator of glycemic control in patients with diabetes.

Phase III- Post-Intervention phase

The Post- Intervention phase is described as the stage after the implementation of the module approach DSME program. Post-test examinations were given to patients before the implementation of each module. The following parameters were identified and assessed to determine the level of knowledge of patients to DM and DM triad management, glycemic control, and physiologic status. The following parameters were assessed; 1) Post-intervention level of knowledge of adolescent patients to diabetes mellitus and DM management. The parameter was assessed by conducting the post-intervention written examination to patients, 2) Post- intervention glycemic control was assessed as another parameter for the effectiveness of DSME. The parameter was assessed by conducting FBS test 3) Physiologic status was also assessed. The parameters included weight and blood pressure, BMI, WHR.

Statistical treatment of data

Analysis of blood glucose plasma results were taken from standards of medical care in diabetes mellitus (ADA, 2017). Normal blood sugar parameters include an FBS and RBS of 100–125 mg/dL (5.6–6.9 mmol/L). Knowledge was analyzed based on the test examination results of the participants in the ten

Treatment Procedure

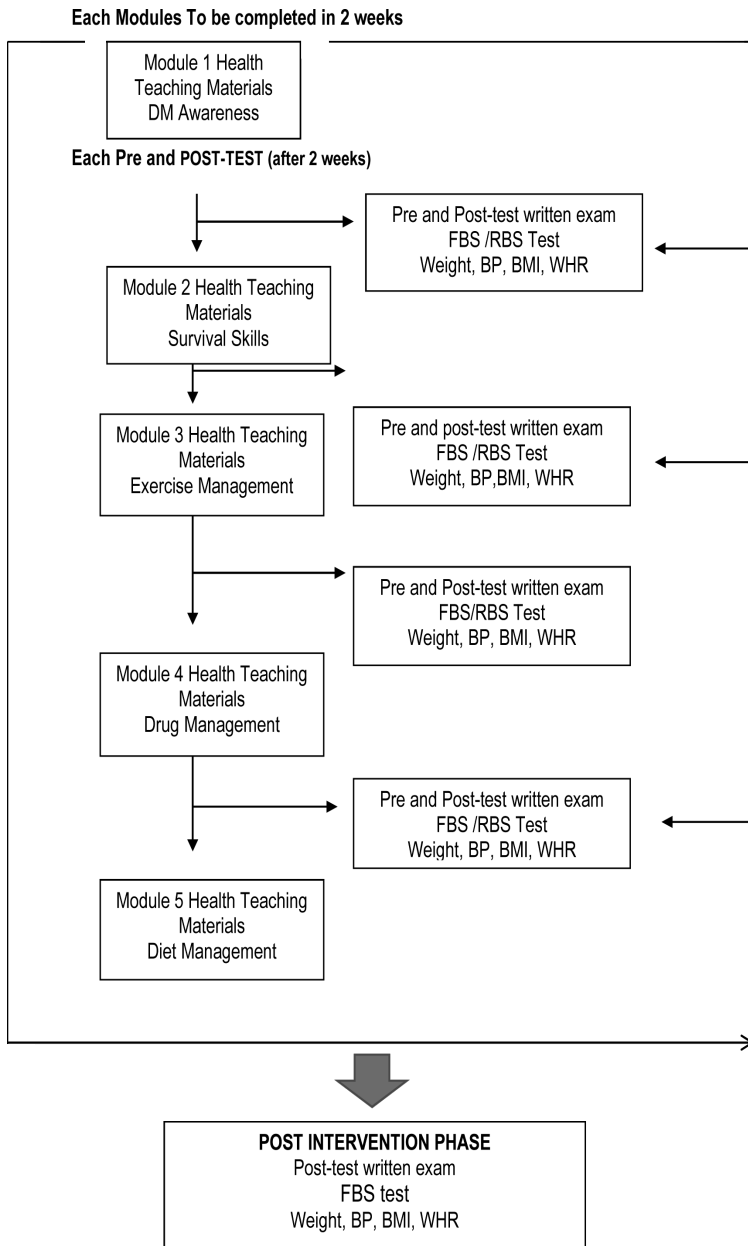


Table 1. Descriptive presentation of the adolescent patients' pre and post intervention parameters (n=15)

Parameters	Module 1		Module 2		Module 3		Module 4		Module 5	
	Pre test Mean ± SD	Post Test Mean ± SD	Pre test Mean ± SD	Post Test Mean ± SD	Pre test Mean ± SD	Post Test Mean ± SD	Pre test Mean ± SD	Post Test Mean ± SD	Pre test Mean ± SD	Post Test Mean ± SD
Knowledge‡	5.93 ± 1.44	7.60 ± 1.80	7.40 ± 1.05	8.40 ± 0.91	7.33 ± 1.59	8.0 ± 1.25	6.80 ± 1.20	8.67 ± 1.25	3.60 ± 1.35	4.60 ± 1.63
FBS*	8.92 ± 4.34	7.96 ± 4.16	7.60 ± 0.00	7.47 ± 0.00	8.92 ± 4.34	8.92 ± 4.34	8.92 ± 4.34	7.60 ± 2.47	8.92 ± 4.34	7.96 ± 4.16
RBS*	120.6 ± 37.87	93.93 ± 20.74	120.60 ± 37.87	93.93 ± 20.74	128.2 ± 56.47	108.6 ± 78.81	103.47 ± 79.84	93.33 ± 25.98	121.5 ± 31.95	124.2 ± 56.0
WHR**	0.82 ± 0.07	0.83 ± 0.08	0.87 ± 0.11	0.86 ± 0.11	0.87 ± 0.08	0.87 ± 0.10	0.83 ± 0.12	0.83 ± 0.12	0.86 ± 0.08	0.87 ± 0.08

‡Scores is interpreted as: Very Satisfactory=>5, Satisfactory= 5; Unsatisfactory <5.

*FBS and RBS results is interpreted normal if results is 100–125 mg/dL (5.6–6.9 mmol/L).

** WHR results is interpreted as normal if it is >80-90 cm

items examination per module administered to them. Passing rate depends on the number of items in the different part of the examination. A passing rate above 50% of the total items gets a verbal interpretation of satisfactory. Below 50% was considered unsatisfactory, while above 50% was considered very satisfactory. The analysis of WHR was taken from waist circumference and waist hip ratio report of World Health Organization (WHO) expert consultation. (WHO, 2008). A WHR of >0.80 to 0.90 is considered normal.

Mean and Standard Deviation was used to present the pre and post-intervention results level of knowledge of adolescent patients to diabetes mellitus and DM management, glycemic control, physiologic status. Wilcoxon signed rank test was used to determine differences in the level of knowledge, FBS, RBS and WHR of patients in the 5 modules of DSME. While Friedman test was utilized to determine differences of FBS results from different modules.

Results

The participants were tested for five parameters before and after the implementation of the DSME. (Table 1).

The five parameters included knowledge in DM management, FBS, RBS and WHR. Knowledge of the participants was tested using the written examination which covered the contents of the 5 modules. The examination results of the adolescent patients with type 1 diabetes mellitus before the implementation of the DSME were very satisfactory in diabetes awareness ($M=7.60$, $SD 1.44$), diabetes survival skills ($M=7.40$, $SD 1.05$), exercise management ($M= 7.33$, $SD= 1.59$), and drug management ($M=6.80$, $SD= 1.20$). However, participants' knowledge before the implementation of DSME were unsatisfactory in diet management ($M=3.60$, $SD= 1.35$). After the implementation of DSME, participants examination results were very satisfactory in DM awareness ($M= 7.60$, $SD= 1.80$), survival skills ($M= 8.40$, $SD= 0.91$), exercise management ($M= 8.00$, $SD= 1.25$), and drug management ($M= 8.67$, $SD= 1.25$). However, participants' knowledge after the implementation of DSME were also unsatisfactory in diet management ($M=4.60$, $SD= 1.63$).

Table 2. Differences in the adolescent patients parameters (pre and post interventions) (n=15)

Parameters	Module 1		Module 2		Module 3		Module 4		Module 5	
	Z ‡	P Value**	Z ‡	P Value**	Z ‡	P Value**	Z ‡	P Value**	Z ‡	P Value**
Knowledge	-2.26	0.02**	-2.11	0.03**	-2.31	0.02**	-2.45	0.04**	-2.87	0.00**
FBS	0.96	0.69	0.13	1.00	0.00	1.00	1.32	0.06	0.96	0.69
RBS	-3.09	0.00**	-1.05	0.29	-1.66	0.09	-1.23	0.21	-3.09	0.00**
WHR	-0.91	0.36	-0.53	0.59	-0.63	0.52	0.79	0.42	-1.71	0.08

‡ Wilcoxon test

** P-value: the difference between the means is considered statistically significant if the p-value is <0.05

Blood glucose plasma parameters such as FBS and RBS were obtained before and after the implementation of DSME. Participants' FBS results revealed high blood glucose levels (>5.6–6.9 mmol/L) before, during, and after the implementation of the DSME. RBS results revealed normal blood glucose levels (100–125 mg/dL) before, during, and after the implementation of the DSME. Waist Hip Ratio of parameters was also obtained before, during and after the implementation of the DSME. WHR parameters revealed normal (>0.80 to 0.90) results.

Comparison in the knowledge, FBS, RBS and WHR parameters were tested using Wilcoxon statistics in each of the implementation of DSME (see Table 2).

Knowledge scores was significantly different ($p=0.05$) in the implementation of all the modules (Module 1 to Module 5) in the DSME interventions to the participants. RBS results were significantly different ($p=0.00$) after the implementation of the Module 1- DM awareness and Module 5- diet management. However, no significant differences were obtained in the RBS results of the participants after the implementation of Module 2,3,4, and 5. No significant differences were also obtained in the WHR parameters of the participants in each of the implementation of DSME.

Comparison in the participants FBS during the implementation of the DSME (Module 1-5) was obtained using Friedman test of difference (Table 3). No significant difference was observed ($z=5.96$, $p=0.20$) in the FBS results of the participants during the implementation of the DSME.

No significant differences ($z=0.96$, $p=0.69$) was observed in the participants FBS results before and after the implementation of the DSME (Table 4).

Discussion

Knowledge in diabetes mellitus and its' management is greatly related to the patient's compliance to treatment (Urgel, et al., 2014, Chavan, 2015, Abebaw, Messele, Hailu, and Zewdu, 2016). In this study, patients' knowledge in diabetes mellitus, survival skills, exercise management and drug management were very satisfactory. This means that patients comply with diabetes management and provide self-care. Study on the efficiency of the training in the "Diabetes School" by Tashmanova (2015) revealed that trained adolescent patients

Table 3. Difference in the adolescent patients' FBS during the implementation of the DSME (n=15)

Parameters FBS	Mean ± SD		
		Z ‡	P Value**
Module 1	8.92 ± 4.34	5.96	0.20
Module 2	8.92 ± 4.34		
Module 3	8.92 ± 4.34		
Module 4	7.60 ± 2.47		
Module 5	7.47 ± 0.00		

‡ Friedman test

** P-value: the difference between the means is considered statistically significant if the p-value is <0.05

Table 4. Difference in the adolescent patients' FBS before and after the implementation of the DSME (n=15)

Parameters FBS	Mean ± SD		
		Z ‡	P Value**
Pre test	7.96 ± 4.16	0.96	0.69
Post test	8.92 ± 4.34		

‡ Wilcoxon test

** P-value: the difference between the means is considered statistically significant if the p-value is <0.05

could give right answers to questions about diabetes compared to untrained adolescent patients. The study also resonates the findings of Flora, Goncalves and Gameiro (2016) about the knowledge of adolescents in type 1 diabetes which revealed that most adolescents had a good level of overall knowledge of diabetes. Al- Hussaini and Mustafa's (2016) study about the adolescent's general knowledge about diabetes also revealed that adolescents have good knowledge in diabetes. The same findings were attained in the study of Moawad et al (2014), Saudi adolescents were found to have good education in diabetes. However, the findings revealed that adolescent patients have unsatisfactory knowledge in diet management. Medical nutrition therapy plays a vital role in the management of adolescents with diabetes. Dietary management is considered the most difficult aspect of diabetes management (Silverstein et.al.2005) and the need of guidance of the nutritionist and the parents is important. Adolescence is a period of rapid biological change accompanied by increasing physical, emotional and cognitive maturity. Adolescents need to be independent can pose problems to diabetes management and compliance especially diet management. Lifestyle management is the fundamental aspect of

diabetes management according to ADA (2017). Diabetes care to adolescent patients include Diabetes Self-Management Education (DSME), Diabetes Self-Management Support (DSMS), nutrition therapy, physical activity, smoking cessation counseling, and psychosocial care. ADA (2017) recommended that all patients with diabetes should participate with DSME in order to facilitate knowledge, skills and ability to diabetes self-care.

Glycemic control is of primary importance to diabetes management of patients with type 1 diabetes mellitus. Patients with type 1 diabetes mellitus is mostly on intensive insulin regimen. The study investigated the effects of DSME in the plasma glucose levels of the adolescent patients. In particular, FBS and RBS levels were monitored before, during and after the intervention of the DSME. The findings revealed that participants FBS levels were high before, during and after the intervention of DSME. However, RBS levels revealed normal results. No difference in the FBS level were noted in the participants after the implementation of DSME. The impact of diabetes education on parents and patients with type 1 diabetes mellitus revealed that the level of knowledge is greatly associated with the level of glycemic control (Martin et al., 2016). FBS and RBS levels remains high and normal respectively in this study. But gradual changes in the RBS levels were identified during the implementation of the DSME. It is recommended by guidelines in diabetes care that A1C levels give consistent picture of patient's glycemic control. However, in this study the use of FBS and RBS parameters were chosen because of the limitations of the study. It would be definite to determine the effectiveness of the DSME materials if A1C levels were used in this study.

The importance of structured education programs has been explained in many studies. In pediatric diabetes, systematic studies of structured educational programs are rare and research studies are focused more on psychosocial interventions (Lange, Swift, Pankowska, & Danne, 2014). Studies on the use of digital tools such as mobile applications, internet portal, websites are available for patients' use to manage diabetes (Sha & Garg, 2015). The use of Diabetes Self-Management Education is first of its kind to be used in diabetes education and management. The limitations of the population, the parameters used, the time it was implemented may greatly affect the results of the study. Further studies are recommended on effectiveness of the DSME modules in the management of adolescent patients with type 1 diabetes mellitus.

Conclusion

The DSME is effective in increasing knowledge of the adolescent patients on diabetes and its management. The content of the diet management module needs to be strengthened and be tested again for its effectiveness in increasing knowledge of adolescent patients. Diabetes education is essential to patients with diabetes mellitus but other factors have to be considered for the adolescent

patients to acquire self-care and have glycemic control. To validate effectiveness of the DSME modules, future study is recommended using Hemoglobin A1C as parameters, in long period of intervention, and in multiple settings with larger population.

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"EVERY NURSE
WAS DRAWN TO
NURSING
BECAUSE OF A
DESIRE TO
CARE, TO
SERVE, OR TO
HELP."

Christina Feist-Heilmeier, RN