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IMPROVING SELF CARE PRACTICE FOR ADULTS WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT

Background: Diabetes is a common condition associated with increased morbidity and mortality. Non-pharmacological intervention strategies focusing on improve self care practices which are considered an important part of the treatment of individuals with diabetes. Therefore, the role of self-care is well recognized as a major focus of international clinical intervention and education. **Aim**: This study aimed at improving self care practice for adults with type 2 diabetes mellitus. **Methods:** A quasi-experimental intervention was conducted in different outpatient clinics on asample of 180 type 2 diabetic patients randomly divided into two equal study and control groups. Data were collected using interview questionnaire, Self care practice scores; self care guideline was developed and implemented on the study group. Data were collected at pre-post, and 3 months follow up phases. **Results:** The results showed that the health information needs were very high in both groups. At post and follow up tests, patients in the study group had statistically significantly higher percentages of satisfactory knowledge, 95.3% and 76.7% respectively ($p<0.001$), compared to 4.8% and 2.4% respectively in the control group. They also had significantly lower caloric intake ($p<0.001$), and significantly higher percentages of adequate practices ($p<0.001$), the rates of adequate practice were 81.4% and 98.8% at the post and follow up phases among patients in the study group, compared to 37.3% and 51.8% respectively in the control group. Study group patients had also statistically significant improvement in their self care practice regarding diabetes mellitus ($p=0.001$). **Conclusion:** In conclusion, the management guidelines protocol was successful improving self care practice for diabetic adults, so it is recommended to apply it in similar settings.

INTRODUCTION

Diabetes mellitus is a complex metabolic disorder characterized by persistent hyperglycemia resulting from defect in insulin secretion, insulin action or both. The two main types of diabetes are type one and type two. All types of diabetes are serious and can result in acute or long-term complications that may diminish both the quality and length of patients lives ***(ADA, 2007)***.

World Health Organization (WHO) estimates that more than 346 million people worldwide have DM. This number is likely to more than double by 2030 without any intervention. Almost 80% of diabetes deaths occur in low and middle-income countries ***(WHO, 2012).*** Type 2 affects 90 to 95 percent of sufferers, and is associated with lifestyle factors such as obesity, with onset usually after the age of 40. Type 2 is responsible for most of the current rise in diabetes and is increasingly affecting the young or middle aged, with more than half of diabetics in developing countries aged between 40 and 59***(IDS, 2008).***

In Egypt, diabetes is on the rise. The International Diabetes Federation (IDF) predicts that nearly 7.6 million Egyptians will have the disease by 2025, making it one of the top 10 countries in the world in relation to diabetes incidence ***(Abdo and Mohamed, 2010).***

People with diabetes can lead a full life, while keeping their diabetes under control. However, this illness requires a life-long management plan, and persons with diabetes have a central role in this plan. Lifestyle modifications are essential components of any diabetes management plan. This modification can be a very effective way to keep diabetes under control. They can improve blood glucose control and prevent or slow the progression of long-term complications ***(Evans and Pinzur, 2005)***.

Nutritional intervention is an integral part of diabetes management and self-care education, aiming at the attainment and maintenance of optimal metabolic outcomes, the prevention and treatment of medical complications, and

the improvement of general health by addressing individual nutritional needs ***(Franz et al, 2002).*** Diabetic people are routinely advised to adopt a healthful diet; dietary changes include modifications in food habits and meal patterns on a lifelong basis. ***(Monnier et al, 2004)***.

A regular physical activity program, adapted to the presence of complications, is recommended for all patients with diabetes for general health benefits and weight loss. Moreover, regular physical activity reduces insulin resistance and prevents type 2-diabetes in high-risk individuals ***(ADA, 2005)***.It promotes cardiovascular fitness and weight loss, lowers high blood pressure, improves lipid profiles, improves blood glucose control in some cases, and leads to an overall sense of well-being. Most patients can benefit from exercise, even people who have longstanding diabetes or diabetic complications ***(Kanaya and Narayan ,2003)***.

Diabetes can lead to foot complications that may escape notice until they become serious. Patients should therefore form the habit of examining their feet everyday. This examination only takes a minute. It is important to examine all parts of the feet, especially the area between the toes; look for any broken skin, ulcers, bunions, blisters, or increased callus formation, and notify the doctor if the patient finds any of these changes. It may be easiest for the patient to remember to check his/her feet if he/she does it at the same point in his/her routine everyday ***(Mayfield et al ,1998)***.

Successful management of patients with type 2 diabetes depends heavily on the patients' response to the knowledge they have of the disease, their awareness of its implications, and their subsequent health behaviors, especially self-care behaviors such as diet, exercise, and weight loss ***(Albright et al, 2001).***Diabetes self-management education, the process of teaching people to manage their diabetes, has been considered an important part of the clinical management of diabetes ***(Norris et al, 2002).***

Diabetes self-management education is a critical element of care for all people with diabetes and is necessary in order to improve patient outcomes ***(Funnell et al, 2009).*** Thus, all patients if given proper guidance and education regarding diabetes care should be able to make significant improvements in their lifestyle, which would be helpful in maintaining good glycemic control. Patients' lack of understanding or attitude hinders proper guidance about disease. It has been observed that improper guidance and communication could lead to poor compliance ***(Badruddin et al, 2002)***.

AIM OF THE STUDY

The aim of this study was to improve self care practice for adults with type 2 diabetes mellitus through:

- Assessment of health needs and demands of diabetic adults regarding self care practice.
- Development and implementation of self care guideline protocol
- Evaluation of the effects of the guideline on self care practice of diabetic adult.

Research hypotheses:

There will be significant difference between the knowledge and practice of diabetic patients who will receive the self-care education program and those who will not receive the program.

SUBJECTS AND METHODS

Research design

A quasi-experimental intervention study design was used in conducting the study.The study was conducted in outpatient clinics of Ain Shams University Hospitals. A purposive sample of consecutive 180 type II diabetic patients was recruited from the study setting. The inclusion criteria set for sample selection were as follows:

- Both sex
- Age between 30 and 50 years
- Can read and write
- Duration of diagnosed type 2 diabetes less than one year
- No previous experience or attendance of any organized programs for caring for DM management self-care.

The subjects were randomly divided into two equal and identical groups. One group was intended for application of the intervention, i.e. the study group (90 subjects), and the other half (90 subjects) was considered as a control group.

Data collection tools

Data were collected using interview questionnaire, Self care practice scores; self care guideline was developed and implemented on the study group. Data were collected at pre-post, and 3 months follow up phases.

- ***Interview questionnaire form*** : This tool was designed by the researchers, and included the following parts:
  - Part I: socio-demographic descriptive data regarding patient age, sex, education level, and occupation.
  - Part II: disease characteristics.
  - Part III: intended to determine patient's knowledge about disease, this part also included questions regarding patient knowledge about physical exercise and nutrition in diabetes.
- ***Self-care skills observation checklist:*** Three checklists were designed by the researchers to describe patient's skills in performing three important self care practices, with three trials for each one:
  - Blood glucose estimation using haemotest equipment (11 steps)
  - Insulin self injection
  - Foot care.
- ***Patient physical assessment and follow-up sheet:*** This sheet was used by the researchers to record patient's height, weight, and blood pressure at the initial and follow-up visits.
- ***Type 2 diabetes self-care guideline:***

Guidelines protocol was designed by the researchers. The protocol included sessions covering theoretical and practical training; interactive teaching methodology was used, with the help of audiovisual aids and group discussions.

Pilot study: a pilot study was carried out on 10 diabetic patients in the aforementioned health setting to test the practicability, clarity and consistency of the tools. The pilot also helped the researchers to estimate the time needed to fill in the data collection forms. The subjects of the pilot study were included among the study sample.

Methods

Necessary approvals were obtained in order to permit the researchers to conduct data collection of the aforementioned health setting. All participants were informed with the purpose and nature of study and oral informed consents were obtained and secured. The interview questionnaire and the physical assessment form were filled. Each questionnaire sheet was filled through individual interviewing with each client. An average of four clients were interviewed per day for both study and control groups. Each client took on average 45-60 minutes for questionnaire filling.

Field work

The actual field of work started from March 2007 till August 2008. The researchers were available for two hours per day in the study setting, two days/week study setting. The researcher introduced herself to the patient with diabetes, and gave a brief idea about the purpose of the study and its component. After the pre-test, the researcher applied the developed guideline protocol for the study group patients only. Clients were trained through guideline protocol sessions on diabetes self-care practices, and knowledge about foot care, skin care, insulin injection, and oral hypoglycemic agents.

Limitations of the study: Some obstacles faced the researcher during carrying out the study. The most obvious was the dropouts, as four patients from the study group and seven from the control group refused to continue after participation in the assessment phase.

Result:

Table 1, illustrates the socio-demographic characteristics of patients in the study and control groups. Their age was quite close, with means±SD 39.3±5.6 and 40.3±4.9 years, respectively. The study group had slightly more males (53.5%), compared to the control group (45.8%). The highest percentages had basic/intermediate education, 62.8% and 69.9%, respectively. The majority of the study (80.2%) and control (84.3%) group patients were married.

Table 1. personal characteristics of diabetic patients in the study and control groups

Items	Group				X^2	p-value
	Study (n=86)		Control (n=83)			
	No.	%	No.	%		
Age (years):						
<40	48	55.8	48	57.8		
40+	38	44.2	35	42.2		
Range	26-49		32-52			
Mean±SD	39.3±5.6		40.3±4.9		1.25	0.21
Gender:						
Male	46	53.5	38	45.8		
Female	40	46.5	45	54.2	1.00	0.32
Education:						
Read/write	0	0.0	3	3.6		
Basic/intermediate	54	62.8	58	69.9	4.94	0.08
High	32	37.2	22	26.5		
Marital status:						
Single	15	17.4	9	10.8		
Married	69	80.2	70	84.3	--	--
Divorced/widow	2	2.3	4	4.8		

(--) test result not valid

Table 2, illustrates that before the intervention patients in the control group had statistically significantly higher percentages of satisfactory knowledge related to hyperglycemia (p<0.001), and prevention (p=0.009). Conversely, patients in the study group had statistically significantly higher percentages of satisfactory knowledge related to lab tests (p=0.001), and medications (p<0.001). At the post-test, patients in the study group had statistically significantly higher percentages of satisfactory knowledge in all tested areas, except for the causes, symptoms and signs, and medications. This improvement in the study group knowledge continued through the follow-up phase, with statistically significant differences in the most of the areas tested.

Table 2. Knowledge about DM among patients in the study and control groups

Knowledge about DM	Pre (% satisfactory)			Post (% satisfactory)			FU (% satisfactory)		
	Study (n=86)	Control (n=83)	p-value	Study (n=86)	Control (n=83)	p-value	Study (n=86)	Control (n=83)	p-value
Definition	97.7	95.2	0.44	100.0	94.0	0.03*	100.0	96.4	0.12
Causes	0.0	3.6	0.12	10.5	4.8	0.17	9.3	2.4	0.10
Symptoms& signs	0.0	3.6	0.12	3.5	3.6	1.00	2.3	1.2	1.00
Complications	0.0	3.6	0.12	37.2	3.6	<0.001*	62.8	0.0	<0.001*
Hypoglycemia	0.0	10.8	<0.001*	38.4	9.6	<0.001*	64.0	3.6	<0.001*
Hyperglycemia	0.0	10.8	<0.001*	70.9	6.0	<0.001*	61.6	4.8	<0.001*
Acetone	1.2	4.8	0.21	32.6	3.6	<0.001*	58.1	2.4	<0.001*
Lab tests	98.8	84.3	0.001*	98.8	84.3	0.001*	95.3	94.0	0.74
Medications	96.5	75.9	<0.001*	100.0	97.6	0.24	100.0	96.4	0.12
Treatment	0.0	3.6	0.12	39.5	2.4	<0.001*	64.0	1.2	<0.001*
Prevention	1.2	10.8	0.009*	58.1	7.2	<0.001*	65.1	4.8	<0.001*

(*) Statistically significant at p<0.05

Table 3, describes the knowledge about diet. Before the intervention, patients in the control group had statistically significantly higher percentages of satisfactory knowledge related to food to be decreased (p<0.001). At the post-test, patients in the study group had statistically significantly higher percentages of satisfactory knowledge in two of the three

tested areas, namely food to be decreased (p<0.001), and snacks (p<0.001). This better knowledge in the study group continued in the follow-up phase, with statistically significant differences in these same areas, p<0.001. The table also demonstrates that the knowledge about food items to be avoided was always high in both groups at the three phases of the study, reaching 100.0% at all phases in the study group.

Table 3. Knowledge about diet in DM among patients in the study and control groups throughout the study phases

Knowledge about diet	Pre (% satisfactory)			Post (% satisfactory)			FU (% satisfactory)		
	Study (n=86)	Control (n=83)	p-value	Study (n=86)	Control (n=83)	p-value	Study (n=86)	Control (n=83)	p-value
Food to be Avoided	100.0	98.8	0.49	100.0	100.0	1.00	100.0	98.8	0.49
Food to be Decreased	17.4	47.0	<0.001*	98.8	37.3	<0.001*	98.8	43.4	<0.001*
Snacks	0.0	4.8	0.06	70.9	4.8	<0.001*	64.0	3.6	<0.001*

(*) Statistically significant at p<0.05

Table 4, describes the knowledge about exercise in DM among patients in the study and control groups, throughout the intervention phases, patients in the control group had statistically significantly higher percentages of satisfactory knowledge related to all tested areas, with the exception of the conditions of exercising. At the post-test, patients in the study group had statistically significantly higher percentages of satisfactory knowledge in all tested areas, p<0.001, except for the conditions of exercising. Similar findings are noticed at the follow-up phase, where the study group knowledge about exercise in DM continued to be statistically significantly better differences in almost all areas, compared to that in the control group.

Table 4. Knowledge about exercise in DM among patients in the study and control groups throughout the study phases

Knowledge about exercise	Pre (% satisfactory)			Post (% satisfactory)			FU (% satisfactory)		
	Study (n=86)	Control (n=83)	p-value	Study (n=86)	Control (n=83)	p-value	Study (n=86)	Control (n=83)	p-value
Importance	0.0	8.4	0.006*	70.9	8.4	<0.001*	59.3	4.8	<0.001*
Conditions	0.0	3.6	0.12	7.0	1.2	0.12	5.8	0.0	0.06
When to stop	7.0	27.7	<0.001*	100.0	49.4	<0.001*	91.9	63.9	<0.001*
Action if Hypoglycemic	0.0	6.0	0.03*	37.2	6.0	<0.001*	64.0	4.8	<0.001*

(*) Statistically significant (p<0.05)

Table 5, shows the total knowledge about DM among patients in the study and control groups throughout the intervention phases. It is evident that at the baseline, before the intervention, none of the patients in the study group (0.0%) had total satisfactory knowledge, compared to 6.0% of patients in the control group. This difference was statistically significant (p=0.03). At the post-test, the majority of patients in the study group had satisfactory knowledge (95.3%), compared to 4.8% of patients in the control group, p<0.001. Similarly, at the follow-up phase, about three-fourth of patients in the study group (76.7%) had satisfactory knowledge, compared to only 2.4% of patients in the control group. This difference was also statistically significant, p<0.001.

Table 5. Total knowledge about DM among patients in the study and control groups throughout the study phases

Satisfactory knowledge about DM (50%+):	Group				X^2	p-value
	Study (n=86)		Control (n=83)			
	No.	%	No.	%		
Pre:						
Satisfactory	0	0.0	5	6.0		
Unsatisfactory	86	100.0	78	94.0	Fisher	0.03*
Post:						
Satisfactory	82	95.3	4	4.8		
Unsatisfactory	4	4.7	79	95.2	138.51	<0.001*
FU:						
Satisfactory	66	76.7	2	2.4		
Unsatisfactory	20	23.3	81	97.6	97.05	<0.001*

(*) Statistically significant (p<0.05)

Table 6, describes the adequacy of self-care practices (score 60%+) related to DM as observed among patients in the study and control groups, throughout the intervention phases. It indicates that at the pre-test, no statistically significant differences were present between the study and control groups as regards blood sugar analysis, insulin injection, and foot care. At the post-test, after the intervention, patients in the study group had statistically significantly higher percentages of adequate practices related to blood sugar analysis, insulin injection, and in total practice (p<0.001). At the follow-up phase, the majority of the study group patients had adequate practices in all three tested areas, and in total practice, with statistically significant differences, compared to patients in the control group.

Table 6. Self-care adequate practices (score 60%+) related to DM as observed among patients in the study and control groups throughout intervention phases

Items	Group				X^2	p-value
	Study (n=86)		Control (n=83)			
	No.	%	No.	%		
Pre:						
Blood sugar analysis	31	36.0	20	24.1	2.86	0.09
Insulin injection	2	2.3	8	9.6	Fisher	0.054
Foot care	58	67.4	57	68.7	0.03	0.86
Total practice	12	14.0	15	18.1	0.53	0.47
Post:						
Blood sugar analysis	76	88.4	34	41.0	41.78	<0.001*
Insulin injection	64	74.4	9	10.8	69.57	<0.001*

Foot care	73	84.9	66	79.5	0.83	0.36
Total practice	70	81.4	31	37.3	34.08	<0.001*
FU:						
Blood sugar analysis	84	97.7	50	60.2	36.04	<0.001*
Insulin injection	76	88.4	7	8.4	107.99	<0.001*
Foot care	82	95.3	65	78.3	10.83	0.001*
Total practice	85	98.8	43	51.8	50.84	<0.001*

(*) Statistically significant at p<0.05

Table 7, describes the changes in the scores of knowledge, practice and the daily caloric intake among patients in each of the study and control groups, throughout the intervention phases. As regards knowledge scores, the table indicates statistically significant improvements in the two groups throughout the intervention phases, p<0.001. However, the increase was higher in the study group, from 34.2 at the baseline to 63.4 at the follow-up phase. The corresponding figures in the control group were 37.1 and 40.2, respectively. Similarly, the increase in the practice scores was higher in the study group, from 38.9 at the baseline to 91.7 at the follow-up phase. The corresponding figures in the control group were 36.7 and 52.0, respectively.

Table 7. Scores of knowledge, practice, caloric intake, and BMI among patients in the study group throughout the intervention phases

	Mean±SD			Mann-Whitney test	p-value
	Pre	Post	FU		
Knowledge					
Study	34.2±3.3	61.4±9.0	63.4±13.0	171.18	<0.001*
Control	37.1±9.5	40.1±7.1	40.2±5.7	25.53	<0.001*
Practice:					
Study	38.9±17.7	79.1±19.6	91.7±9.33	153.65	<0.001*
Control	36.7±22.6	46.8±23.5	52.0±24.1	9.25	<0.001*

(*) Statistically significant (p<0.05)

DISCUSSION

This study had two groups of diabetic patients; a study group for implementation of the guideline protocol, and a control group for comparison. The two groups were quite similar in most important characteristics. Thus, the age of both groups was close, and their means were around forty years. This is the usual age of patients with type-2 DM as pointed out by ***Fabian et al (2006)*** who have claimed that the majority of type-2 diabetics are in the age group around 45 years old.
The gender distribution of patients in the two groups was also similar. As regards education, the majority of patients in the two groups were educated. This selection of educated patients was important in order to get the maximal benefit from the guideline protocol. Conversely, illiteracy would create a barrier hindering the proper compliance to the therapeutic regimen. On the same line, ***Pace et al (2006)*** have demonstrated that low education levels can certainly limited information access, especially when acknowledging that adult patients are responsible for their own daily care. In this sense, diabetes patient education stands out as a fundamental care aspect to control the disease and, thus, prevent or delay the appearance of acute and chronic complications.

The present study has revealed that the patients in the study group and majority in the control group had unsatisfactory knowledge before the intervention. The areas of major deficiency in knowledge were related to causes, symptoms and signs, and complications of DM, as well as the hypo- and hyperglycemia, and treatment. A deficient knowledge about food items to be decreased and importance of snacks were also revealed. Lastly, the knowledge about exercise in DM was very deficient.

The findings are in agreement with ***Thungathurthi et al (2012) and West*** (***2002)*** who has similarly reported that patients with diabetes mellitus often lack sufficient knowledge about their disease, and thus frequently have poor self-management skills. On the same line, ***Warsi et al (2004)*** has mentioned that it is estimated that 50-80 percent of people with diabetes lack knowledge and skills needed to adequately manage their diabetes. Therefore, it is of importance for persons with newly diagnosed diabetes to understand self-management and its impact on blood glucose level, and overall health in order to improve clinical outcomes and to avoid complications. Furthermore, ***Ellis et al (2004)*** has asserted that people with diabetes generally have a poor knowledge of care, and that there is no consistency in the way information is delivered to patients. This leads to people feeling more threatened, restricted and depressed by their diabetes.
Our findings point to the success of the intervention in improving the knowledge of diabetic patients in the study group, and the improvement was retained after three months of follow-up.

Moreover, and in agreement with the present study finding of improvement in patients' knowledge about diabetes after implementation of the self-care guidelines program, ***Murata et al (2003)*** has ascertained patient education is the cornerstone of care for patients with Type 2 diabetes mellitus. Knowledge of diabetes forms the basis for informed decisions about diet, exercise, weight control, blood glucose monitoring, use of medications, foot and eye care, and control of macrovascular risk factors.

Therefore, diabetic patients with lack of knowledge and feelings of disempowerment on a daily basis need more education. However, this should be evaluated properly to ascertain its effects in improving patients' outcomes ***(Gary et al, 2003) and (Steed et al, 2003)***. Also ***Persell et al (2004)*** added that knowledgeable patients were more likely to perform self-management activities.

Concerning diabetic patients' knowledge about diet in DM, the present study results have shown that patients in the study group had statistically significantly better knowledge in most areas of related knowledge after intervention.
These present study findings are in line with ***Albright et al (2001)*** who have also added that successful management of patients with type 2 diabetes depends heavily on the patients' response to the knowledge they have of the disease, their awareness of its implications, and their subsequent health behaviors, especially self-care behaviors such as diet, exercise, and weight loss.

Also ***Meetoo & Temple (2003)*** added that the notion of self-care with regard to a recommended diet is considered important in order to avoid life-threatening complications associated with diabetes. It would therefore be reasonable to assume that motivation to follow a healthy diet would be high. In the same respect, ***Wolf et al (2004)*** has emphasized that diabetes control has also shown improvement when dietary instructions, including specific situational examples and applications in educational plans, can result in better glycemic control, which reduce disease burden.

Also the present study has demonstrated statistically significant improvements in their knowledge about exercise in DM. Thus, before implementation of the self-care guidelines program, patients in the control group had statistically significantly better knowledge in almost all related areas of exercise. At the immediate post-test, patients in the study group had statistically significantly better knowledge in most tested areas. This improvement continued throughout the follow-up phase.

In agreement with these present study findings, ***Gulve (2008)*** has reported that exercise, along with dietary intervention, represents first-line therapy for diabetes mellitus. Aerobic exercise is recommended for its beneficial effects on glucose control as well as its abilities to retard the progression of other comorbidities common in patients with diabetes, such as cardiovascular disease. The capability of aerobic exercise to improve glycemic control in diabetes is well documented.

However, in order to be effective, the exercise program should be individually tailored, and based on evaluation of the patient's adaptation to effort, in terms of frequency, intensity and duration of the exercises ***(MacKinnon, 1999)***. Moreover, before beginning a program of physical activity, people with diabetes type should be assessed for conditions that might be associated with increased likelihood of cerebrovascular problems, or might predispose to injury such as uncontrolled hypertension. This has been taken into account in the present study guidelines protocol, and patients were provided complete knowledge about pre-exercise conditions, type and intensity of activity, as well as necessary precautions before, during, and after exercise.

The present study self-care guidelines training program had also an important practical component. Three important areas of practical training were selected and included because of their importance to diabetic patients. These were namely self-measurement of blood glucose level, self-injection of insulin, and foot and nail care. Before the program, the study findings have shown very low levels of adequate practice. Immediately after the program, patients in the study group had statistically significantly better practices related to all three skills. This difference was maintained at the follow-up phase.

These present study findings indicate the success of the training program not only in improving patients' knowledge about DM, diet and exercise, but also in translating this knowledge into actual practice. The results are in agreement with the recommendations American Diabetes Association ***(ADA, 2004a)*** regarding the importance of self-management skills in diabetes care. This has also been stressed by the Veterans Health Administration that has emphasized that patients' ability to understand and carryout their individual treatment regimens is critical to the control of diabetes mellitus. Patients with diabetes mellitus need education to improve the disease because knowledge alone does not translate into improved blood sugar control, cholesterol levels, weight management, or mortality rate ***(Mayfield et al, 1998).***

Also in agreement with these present study findings, ***Jeffcoate et al (2007)*** have claimed that exposure to current best practice foot care recommendations and the incorporation of those practices into patients' daily lives may help them prevent future wounds and possible amputation. Additionally, learning proper foot care and dealing with foot problems early can prevent 50 percent of amputations among people living with diabetes. Foot ulcer patients were also found to be more often men living alone, and obese patient with diabetes. Therefore, high-risk foot conditions should be identified early, and educated regarding their risk factors and appropriate management.

Norris et al (2002) have reviewed the effectiveness of self-management training in type-2 diabetes. Positive effects of self-management training on knowledge, frequency and accuracy of self-monitoring of blood glucose, self-reported dietary habits, and glycemic control were demonstrated in studies with short follow-up, less those six months. The authors have concluded that educational interventions that involved patient collaboration may be more effective than didactic interventions in improving glycemic control, weight, and lipid profiles. In the same line ***ADA (2011)*** and ***Colberg et al (2010)*** added that self-monitoring provides information about current glycemic status, allowing for assessment of therapy and guiding adjustments in diet, exercise and medication in order to achieve optimal glycemic control. Irrespective of weight loss, engaging in regular physical activity has been found to be associated with improved health outcomes among diabetics.

Also, in congruence with the present study, ***Wattana et al (2007)*** have carried out a study in Thailand with the objective of determining the effects of a diabetes self-management program on glycemic control, coronary heart disease (CHD) risk, and quality of life in 147 diabetic patients. The findings indicated that the diabetes self-management program was effective for improving metabolic control for individuals with diabetes. Similar findings have also been reported by ***Polonsky et al (2003),*** who have shown that a multiday group education and skills training experience combined with daily medical management, followed by case management over 6 months was effective in promoting better diabetes care and positively influencing glycemia and diabetes-related self-care behaviors.

CONCLUSION

In the light of the study findings, it is concluded that type-2 . The knowledge and practices related to DM, , diet, and exercise, blood glucose self-measurement, and insulin self-injection were low in the two groups before the intervention. At the post and follow-up tests, patients in the study group had significantly higher percentages of satisfactory knowledge and adequate practices. They had also significantly lower daily caloric at the post and follow-up phases. Therefore, the self-management guidelines protocol was successful in improving patients' knowledge, practice, and caloric intake.

RECOMMENDATIONS

In the light of the main study findings, the following recommendations are proposed.

Self-management and health education programs should provided for diabetic patients. Also this program should include practical sessions for training diabetic patients in certain important skills related to foot and nail care, diet planning, and other self-care skills.

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