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Effect of Self-Directed Management Implementation on Short-Term Complications among Patients with Type II Diabetes Mellitus

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Abstract: According to the World Health Organization (WHO), the primary component of patient-centered treatment is self-management practices, which serves as the foundation for the management of diabetes mellitus. **Purpose:** to examine the effect of self- directed management implementation on short-term complications among patients with type II diabetic patients. **Design:** Quasi Experimental design. **Setting:** The outpatient medical clinic of Menoufia University Hospital in Egypt. **Sampling:** A consecutive sample, which included 240 diabetic persons with Type II Diabetes Mellitus, the sample was selected randomly to assign them into of 120 in each group; 120 in control group, while study group was divided into subtype groups (study1 and study2) 60 patient in each group. **Instruments:** Three instruments used to collect the current data; Instrument (I): Diabetes Mellitus Structured Questionnaire; Instrument (II): Bio physiological measurements. Instrument (III): Patient's self-practices in management. **Results:** the existing outcomes recorded that; study2, who implemented self- directed management practices with olive oil have been associated with better improvement in all lab investigations as blood glucose 146.33± 25.74, while 167.17 ± 46.28 & 266.94± 63.27 respectively; in study1 and control group; furthermore high density (HDL) in study2 65.90± 2.72 if compared with 62.68 ± 4.04& 65.90± 2.72 respectively; in study1 and control group, also decreasing in low-density lipoprotein (LDL) in study2 than other groups (94.63± 3.31, 96.40 ± 3.35&153.39± 13.99) respectively; highly significance difference among studied groups in short term diabetes complications frequency after application of self-management practices (study2 better than study1&control group). **Conclusion:** The existing study concluded that implementing of directed self-management practices with olive oil as part of a health dietary plan is likely to produce better Type II Diabetes Mellitus outcomes and reduce short term complications when combined with physical exercise. **Recommendation:** Replicate the study in another setting and using a larger sample size to generalize the search results. Self- management program can be applied as a hospital routine care for patient with diabetes.

Keywords: *Self- Directed Management, Nursing, Short-term complications, Type II Diabetes Mellitus.*

Introduction

Self-directed diabetes management (DSM) is an effective technique for treating diabetes and preventing its associated short- and long-term problems; hence, all diabetic patients must be motivated to engage in self-directed diabetes management from the time of diagnosis onwards. DSM is designed individually by collaboration with a number of health care professionals, including nurses, doctors, and therapeutic dietitians. Engaging patients and their families in self-directed self-management has evolved into the cornerstone of diabetes care. DSM is the process of actively engaging patients in self-care activities to improve their behavior and well-being to manage the condition's symptoms (Roger Carpenter, Toni DiChiacchio & Kendra Barker 2019).

About 90 to 95% of all diabetic people were Type II diabetes mellitus (T2DM); it remains a substantial public health concern, especially in low-income countries, as African nations, where it has a significant influence on morbidity, mortality, and health care resources. Egypt is ranked as the seventh most populous country for T2DM sufferers. During the past two decades, the frequency of T2DM has nearly doubled in Egypt. T2DM is caused by a reduction in insulin production by the pancreas or by insulin's failure to transfer glucose into cells, so depriving the cells of energy due to "insulin resistance" (Shaban et al., 2022).

The International Diabetes Federation (IDF) (2021) predicted that the prevalence of diabetes mellitus will continue to rise, making it one of the most major health challenges of the 21st century. In addition one in ten people aged 20 to 79 years developed diabetes mellitus over the century. The corporate and public sectors incurred significant economic and health costs as a result. Diabetes mellitus (DM) is a collection of hyperglycemia-related metabolic disorders with a chronic course. Over 90% of diabetics have T2DM, which causes hypoglycemia and hyperglycemia as short term complications and micro- and macro-vascular disorders as long-term complications (Dhamani et al., 2022, Abouzid et al., 2022 & Khalil et al., 2022).

As Type II Diabetes Mellitus (T2DM) is a chronic disease that increases the burden on patients and their families, patients' self-management practices should be supplemented with education on dietary modification, glucose monitoring, controlled weight loss, and regular exercise to prevent complications and improve patients' health outcomes. Directed self-management methods aim to provide diabetic patients with the information, problem-solving abilities, decision-making skills, resource utilization skills, and self-assurance required to perform self-care activities. Self-management measures can avoid both short- and long-term consequences of diabetes, which play a crucial role in preventing diabetes-related problems around the world, particularly in the industrialized world (Hailu, Moen & Hjortdahl 2019).

According to the American Association of Diabetes Educators (AADE), seven items of self-management practices should be employed as nutritious diet, regular physical activity, frequent blood sugar monitoring, medication adherence, an effective problem-solving strategy, resilient coping abilities, and risk reduction behaviors. On the other hand, several studies have showed that self-management approaches aimed at significantly improving glycemic

control, minimizing acute complications, and avoiding or postponing chronic consequences associated with T2DM significantly improve or delay these outcomes (Dhamani et al., 2022).

By acting as the link between theory and practices, nurses may drive good changes and alter healthcare delivery. Directed self-management (DSM) by nurses is the priority for individuals with type II diabetes (T2DM). It is essential that nurses possess the skills and knowledge necessary to support their T2DM patients in getting high-quality teaching and assistance with self-management approaches (Azami et al., 2018 & Hall & Tolhurst 2020).

Self-monitoring of glycemic level is one criterion of self-management, and it is a very significant tool for T2DM patients to achieve a healthy glycemic level to regulate their condition. Maintaining a good glycemic level by controlling carbohydrate intake through food selection, modifying eating habits regarding glycemic load, fats, and a healthy diet, managing blood glucose by taking anti-diabetic medications, monitoring glucose levels using a glucometer or sensors, engaging in appropriate physical activity (to optimize glucose level, control weight, or maintain good health), and scheduling activities based on their current glycemic level. Additional daily duties for diabetic self-management include adjusting the carbohydrate composition of meals and managing high blood glucose levels (Schmitt et al., 2022).

Uncontrolled glycemic management is associated with an increased risk of acute complications, including severe hypo-or hyperglycemia and hyperglycemic hyperosmolar nonketotic syndrome. Hyperglycemia arises from food and physical activity, illness, and medications not related to diabetes; which may lead to a hyperosmolar hyperglycemic among T2DM; while hypoglycemia happens when a patient's blood glucose is too low, below 70 mg/dl, it caused by taking medication and performing physical activity without eating sufficient meal. So, acute complications can be prevented by proper self-management practices especially good glycemic control which is crucial for sustaining health and minimizing complications and mortality (Schmitt et al. 2022 & Moghetti et al., 2021).

Moreover regular physical exercise for 30 minutes for five day per week is soundly deliberated a basis in the management of T2 DM. It had many advantages as controlling blood glycemic level, a significant lowering in body mass index (BMI) and improving general well-being by prevention of diabetes complications. Planned exercise interventions including different types as walking (aerobic exercise), and weightlifting (resistance exercise) or together, they have better effects on blood glucose level (Abubakr, Salama& Abd El-kader. 2020).

Also dietary management is essential for lowering glucose levels in type II diabetic patients. A diabetic diet must include the healthiest foods in modest quantities and regular meals. It has been shown that diets high in whole grains, fruits, leafy greens, legumes, and nuts and low in refined grains, red/processed meats, and sugar-sweetened drinks reduce diabetic complications, maintain glycemic control, and reduce blood lipids (Boocock 2023).

American Diabetes Association and Silveira et al., (2022) recommended intake of olive oil as part of a healthy diet in a standard amount of 3 to 4 tablespoons per day. Due to its high

concentrations of monounsaturated fatty acids (MUFAs), polyphenols, hydrocarbons, phytosterols, and tocopherols, it is beneficial in decreasing the glycemic level in individuals with Type I and Type II diabetes.

Olive oil is a natural product derived from medicinal plants that, in addition to its nutritional qualities, is suggested by several recent studies as a treatment for cardiovascular disease. (Silveira et al., 2022, Mauro Finicelli et al., 2021 &AL-Asmari et al., 2020) they expressed that; it is rich in oleuropein and hydroxy-tyrosol which significantly lower blood glucose levels among insulin-resistant patients.

Therefore, current study the researchers used directed self-management to evaluate reduction of short-term complications among diabetic patients. Otherwise used directed self-management and olive oil to assess their effect on Bio physiological measurements (Body mass index (BMI), blood pressure and lab investigations) among patients with type 2 diabetes. Finally the purpose of this study was to examine the effect self-directed management implementation on short-term complications among type 2 diabetic patients.

Significance of the research:

The prevalence of T2DM by 2019 in Egypt was estimated to be 9.3 percent (463 million people). It is anticipated that the prevalence would increase to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045. Urban areas have a higher incidence (10.8%) than rural areas (7.2%), whereas high-income states have a higher prevalence (10.4%) than low-income nations (4.0 percent). Currently, it accounts for around 15.6 percent of all persons aged 20 to 79. The office of statistical report in Menoufia University hospital documented that yearly data report on follow-up rates for 1200 cases had type II diabetes mellitus (Abouzid et al., 2022 & Saeedi et al., 2019).

Diabetic patient's knowledge is a vital tool for regulating T2DM, and the prevalence of its problems increases in the absence of it; it is considered a prerequisite for good self-care activities and positive health outcomes (Shaban et al., 2022 & Dhamani et al., 2022). In T2DM, self-management of diabetes through good diet, physical exercise, precise medication consumption, and frequent blood glucose monitoring has a favorable influence on diabetic control beside some researches identified that Olive oil have a positive influence on glycemic control. Olive oil is contained natural components such as lipophilic derivatives, hydroxy-tyrosyl acetate (HT-Ac), and ethyl hydroxy-tyrosyl ether, which had beneficial effects on high-density lipoprotein cholesterol and low-density lipoprotein cholesterol, thereby lowering arterial hypertension. Therefore, olive oil was employed to perform focused self-management strategies in the study (Silveira et al., 2022, Finicelli et al., 2021 & AL-Asmari 2020).

Therefore the purpose of the study: to determine the effect of self- directed management implementation on short-term complications among patients with type II diabetes.

Objectives: to evaluate the following:

- The effect of self- directed management and olive oil on biophysiological parameters (BMI, blood pressure, and laboratory tests) among individuals with type II diabetes mellitus.
- The effect of directed self-management and olive oil on the incidence of short-term

complications in people with type II diabetes.

Research hypothesis:

1) Patients who receive the self-directed management practices (study group) are expected to exhibit higher level of knowledge than patients who do not (control group).
2) Patients who receive self- directed management practices (study group) are expected to exhibit higher level of practices than patients who do not (control group).
3) Patients who receive self-directed management practices and olive oil are expected to have fewer short-term complications than those in study1 and the control group.
4) Patients (study 2) who get self-management techniques and olive oil will have improved biochemical tests, blood pressure, and body mass index (BMI) compared to patients in study group 1 and the control group.

Methods

Design:

Quasi Experimental design was utilized for this study.

Setting:

The study was conducted in the outpatient medical clinic (which exist in the first floor of Menoufia University Hospital) and the medical department (which exist in the fifth floor of Menoufia University Hospital, it consists of 2 department, one for female and the other for male) of the Menoufia University Hospital in Shebin El –Kom, Menoufia Governorate, Egypt.

Study Duration:

Data was collected over a 9 month, from beginning of January 2022 to ending of September 2022.

Sampling:

Confidence=94% & Error=6%. Formula for calculate sample size n=N/1+Ne2
n= corrected sample size, N = population size, and e = Margin of error (MoE),
e =0.06
n=1200/1+(1200) x (0.06)2 → n=1200/1+(1200x0.0036) → n=1200/1+4.32 → n=1200/5.32 n=225.6=226 (Yamane, 1973). The researchers increased the number into 240 patients. (To divide them into equal two groups 120 patients in each group).
A consecutive sample of 240 type II diabetic patients was recruited after their participation in the study was authorized. Randomly subjects were divided into two groups (120 for each). The study group was divided into study 1& 2, with 60 patients in each group. Study1: implement self-management practices and conventional diabetes treatment of T2DM. Study2: implement self-management practices, used olive oil along with their therapist diet and conventional diabetes treatment of T2DM. Control group: conventional diabetes treatment of T2DM.
Sample was chosen according to the following inclusion and exclusion criteria:

Inclusion criteria:

Diabetic patients who visited the hospital's output diabetic clinic their age between 35 and 65 years, both sexes diagnosed with type II DM less than one-year prior, uncontrolled DM type II, and willingness to participation in the study.

Exclusion criteria:

Other types of Diabetes and Anemia were excluded because they affect Hba1c levels/ glucose level.

Instruments of the study:

The researcher used the following instruments to achieve the aim of this study:

Instrument I: Diabetes Mellitus Structured Questionnaire:

This instrument was developed by researchers to collect data; it was divided into three parts. Part one includes socio-demographic and medical information, such as age, gender, education, marital status, smoking status, and duration of diabetes. Part two: The patient's knowledge of diabetes mellitus and its acute complications (pre-post), including 19 MCQ questions about the definition of DM, causes, pathophysiology of disease, signs and symptoms, kinds of acute complications, their therapy, and olive oil. The total grade varied from 1 to 19 points. It is described as 1-9 grade or 50% indicating weak understanding, 10-14 grade or 50-75% indicating acceptable knowledge, and 15-19 grade or 75% indicating a good level of knowledge. Part three: the frequency of hypoglycemia and hyperglycemia on an ongoing basis.

Instrument II: Bio physiological measurements:

The first section comprised anthropometric data, such as weight and height, while the second section included biochemical tests, such as fasting glucose levels, triglycerides, total cholesterol, low density lipoproteins, and high density lipoproteins. Bio physiological measures, whose findings are compared to the standard, lack a grading system. Instrument III: Patient self-practices and compliance of diabetes care. It was designed by researchers include daily blood glucose level monitoring, physical activity, and dietary compliance. : Each question received a score of two for compliance with measures, one for compliance sometimes, and zero for noncompliance.

Validity of the Instruments:

The face validity of each instrument was evaluated by three experts in Medical Surgical Nursing, Faculty of Nursing Menoufia University and two experts in therapeutic nutrition, Faculty of Home Economics.

Instrument's Reliability:

Ten individuals' dependability was tested utilizing the test-retest technique with a two-week delay between each test. Then, a Cronbach alpha reliability test using SPSS was undertaken. The Cronbach alpha reliability rating for instrument I was 0.89 for the second section, which assessed patient knowledge of type II diabetes complications and associated treatment. The Cronbach alpha reliability rating for Instrument II was of 0.82. (Bio-physiological measures). The Cronbach alpha reliability score for Instrument III was 0.87 for the patient self-practices and adherence questionnaire for short-term diabetic control.

Pilot study:

Ten percent of patients participated in a pilot study before begining of actual data collection; to assess the utility of the research instruments, clarity, and procedures. Pilot study participants were eliminated from the study population.

Ethical considerations:

Afterwards description the purpose of the study, the researchers will be asked for participants agreement; they had the autonomy to withdraw at any time without reason. They were told that any information gathered would be kept strictly secret and utilized solely for research purposes. Confidentiality and discretion will be guaranteed. In addition, patients' identities will be protected by encoding all data and storing all documents in a locked cabinet. Specifically, the data will be saved on the computer of the researcher, which is password-protected.

Implementation of self-directed management:

It consists of three phases as follows:

(1) Preparatory phase:

A written approval was obtained from the Ethical and Research Committee of the Faculty of Nursing at Menoufia University. After describing the purpose of the study to the hospital administrator of Menoufia University Hospital, and chief nurse of the medical outpatient clinic.

To develop the plan for the interventions, the researcher reviewed voluminous literature as role of therapeutic diets and physical exercises in management of type II DM. The researchers prepared an illustrated, organized, and colored booklet was prepared in plain Arabic. The booklet divided into: part one included all information about type II diabetes, its short-term complications, and the role of self-management practices in controlling type II diabetes, such as weight loss and adherence to dietary instructions. There were selections for breakfast, lunch, supper, and snacks on the menus, this booklet was introduced to study1; and booklet part two, included all information and practices like part one plus all information about olive oil adherence to dietary instructions and its role in managing diabetes, this part was introduced to study 2.

Nutritional requirements:

Initially, before the start of dietary management and daily routine modification, the food intake of each patient was recorded on a 24-hour recall form for three days per week, (Laurence et al., 2017). Using software, the nutritional value of consumed foods was evaluated (Food Analysis Computer Program, 1995). Adequacy of the Food and Nutrition Board, the Institute of Medicine, and the National Academies. (IoM, 2005) & (Institute of Medicine of the National Academies, Food and Nutrition Board, 2005).

The total energy demand was calculated using the Institute of Medicine's Estimated Energy Requirement (EER) formulae (IoM, 2005) based on the collected patient data (age, weight, height, and degree of physical activity):

Men (19 years and older)

EER = [662 – (9.53 X age (yr.))] + PA* X [(15.91 X wt. (kg)) + (539.6 X ht (m))]

Women (19 years and older)

EER = [(354 – (6.91 X age (yr.))] + PA* X [(9.36 X wt. (kg)) + (726 X ht (m))]

Estimated energy needs; weight = body mass; height = height; PA = Physical activity coefficient.

Meal planning:

A caloric intake of 1200–1500 kcal/day for women and 1500–1800 kcal/day for men is often related with better glycemic control, lipid profile, and blood pressure. As indicated by the Dietary Guidelines for Americans

2020–2025, patients with type II diabetes should consume at least 14 grams of fiber per 1,000 calories. The researchers utilized the indicated CHO allocation for persons with T2DM recommended by the Professional Practice Committee of the American Diabetes Association 2022 as follows 44–46% of total daily calories (depending on individual goals, it can be 26–45% of total calories, or less than 26% of total calories) and while <10% of total daily calories was recommended from nutritive sweeteners.

A diet consisting primarily of three to five varieties of vegetables per day (dark leafy vegetables, red meat, orange, vegetables, legumes and seeds, and starchy vegetables, among others); red meat is consumed no more than once per week in quantities not exceeding 60 grammes, eggs no more than three times per week, chicken or turkey breast no more than three times per week and fish high in omega-3 content no more than twice per week (Dietary Guidelines for Americans 2020-2025).

Regarding study2 involving olive oil, the researchers advised the participants to consume 3 to 4 teaspoons of extra olive oil per day as follows: one teaspoon in the morning before breakfast and the remaining three spoons with the remaining three meals; it may be added to salads and other foods as desired (American Diabetes Association Professional Practice Committee 2022).

(2) Intervention Phase:

The intervention continues for 9 months to ensure that they followed the guide, reinforce the message, discuss any obstacles, and provide additional information. The researchers started this phase by interviewed patients and outlined the study's goal and methodology. Using a standardized interviewing form, each patient in both groups was questioned to collect personal and medical baseline data. Prior to the start of the pre-interventions test, it took between twenty and thirty minutes to complete the questionnaire.

To reduce bias and sample contamination, the researchers first recruited a control group. One day every week, the researchers visited the outpatient medical clinic. In the first week of each month, the researchers met the patients and had them complete the questionnaire. After that the researchers gave each patient in study group 1&2 a color-illustrated booklet.

Self- Directed Management program included 12 sessions about diabetes self-care education. Each session lasted 60–90 minutes, and there were two every week. The primary purpose of these seminars was to provide participants with the necessary information, skills, and mindset to effectively manage the condition and its acute consequences. General information about the disease, a healthy lifestyle, treatment options, meal planning, planned physical activity, taking diabetes medications, and managing episodes of low or high blood glucose; self-monitoring and follow-up of lab investigations as blood glucose level and lipid profile, measurement of blood pressure, body weight (body mass index) and early detection signs and management of hypoglycemia or hyperglycemia and when to seek medical care; and emotional and psychological support for those with diabetes were discussed. Educational materials were created in the form of 8–10-minute included PowerPoint presentations with useful and visually appealing images and videos. A colorful, well-illustrated educational booklet and handouts

adapted to the local context; at the conclusion of each session, extensive and interactive discussions with peers and take-home activities; each group consisted of approximately five to eight participants to confirm performing the practices, discuss any obstacles, and provide additional information.

During the second week, the patients presented the findings of their laboratory examinations. The same weight measurements were performed as in the last study in order to estimate BMI and blood pressure, record the results of laboratory tests, and compare them to the findings of the previous investigation. Before leaving the outpatient clinic, each group is instructed to return the tests the following week. The study group is notified that they must stick to the same requirements or alternatives for the next two weeks. And repeat the steps throughout the third and fourth weeks.

(3) Follow up and Evaluation Phase:

The researchers taken several measurements to evaluate the effectiveness of self-directed practices but recorded only four evaluations. During each findings of their laboratory examinations. The same weight measurements were performed as in the last study in order to estimate BMI and blood pressure, record the results of laboratory tests, and compare them to the findings of the previous investigation.

The four measurements as follows; first evaluation before to interventions (pre-intervention); second assessment or follow-up after two months (post 1-intervention); third assessment after three months (post 2-intervention); and fourth assessment after four months (post 3-intervention). There was a comparison between the two groups. It lasted around forty minutes.

Data extraction:

The retrieved data were entered into an Excel spreadsheet. The inputted data was shown twice to check its accuracy and completeness. Inconsistencies in the gathered data were examined, and differences were resolved through the establishment of consensus.

Statistical methodology:

On an IBM compatible computer, version 20 of the SPSS (statistical software for the social sciences) statistics package was used to tabulate and analyze the gathered data. There are two sorts of statistics: 1) Descriptive statistics were presented as mean and standard deviation (X+SD) for quantitative data, and as number and percentage for qualitative data (No & percent). 2) Statistical analysis: This is a significant test used to investigate the relationship between two qualitative variables. 2- Student t-test: a test of statistical significance used to compare two independent groups of normally distributed quantitative variables. 3- Repeated measures ANOVA is a significance test used to compare quantitative variables with normally distributed means across more than two groups.

P-value of 0.05 was used to determine significance regarding:

- P-value > 0.05 to be statistically insignificant.
- P-value ≤ 0.05 to be statistically significant.
- P-value ≤ 0.001 to be highly statistically significant.

Results:

Table 1 Represents that mean age of studied sample was (52.47 ± 2.65, 52.97± 2.94 &53.10± 2.62) respectively. The majority of them were female and married. Regarding level of education about 51.7%, 58.3% & 53.3 from studied groups had

secondary education level. There was no statistically significant difference among studied sample regarding to socio-demographic characteristics.

Table 2 clarifies that there was presence of reduction in mean and standard deviation of BMI from (30.45 ± 1.81, 30.08± 2.21, &30.23± 1.52 pre intervention to (22.48 ± 1.97, 21.68± 1.77 & 28.39± 1.58 post 3 interventions) in studied sample respectively.

In relation to systolic and diastolic blood pressure in studied group there was highly statistically significant differences at all measurements post 3 intervention.(p <0.001).

Table 3 displays that improvement in mean of the knowledge scores for both study groups (study 1&2) from (22.06 ± 0.25 & 23.03± 1.19 to 63.35 ± 1.81&61.98± 3.70) respectively compared to control group throughout study phases with highly statistical differences (from 22.25± 0.57 to 23.77± 2.15)P <0.001.

Figure 1 shows that 90% of study 2 had a good level of the knowledge about olive oil post intervention, while about 81.7% & 84.2% respectively from study 1 and control groups had poor level of the knowledge (84.2%) about olive oil post intervention.

Table 4 reports that there was presence of highly statistical significant improvement (return to normal range) in mean and standard deviation in all laboratory investigations in study 2 (olive oil group) after application of nurses led interventions if compared with study group 1 and control group throughout different intervals(P<0.001).

Table 5 presents that there was statistically significance difference between patient's compliance with self-care practices in type II diabetes mellitus among studying groups (studying 1&2) throughout different intervals P(<0.001).

Table 6 reveals that the mean score of self-practices management in study1& 2 were (2.35±3.91&2.21±4.38) pre intervention, while there was improvement in self- management in study 1 and study 2(18.66±3.0;& 18.66±3.0) respectively post intervention compared to Control group (from 1.33±3.87 to 3.01±5.73).

Table 7 illustrates that there was presence of decreasing in mean and standard deviation of short term diabetes complications frequency for study 2 if compared with study 1 and control group after application of self-management practices throughout different intervals; with highly statistical differences.

Table 8 shows that there was a negative correlation between occurrence of DM complications among study group 1 and group 2 pre interventions.

Table 9 documents that there was a significant negative correlation between Directed self- management by learned practice and incidence of DM complications hypoglycemia and hyperglycemia (post intervention 3); with a highly significant difference between group 1 & 2(p<0.001, <0.001).

Table (1): Distribution of the studied groups regarding socio-demographic characteristics: (n=240)

Demographic characteristics	Studied groups						Test of sig.	P value	
	Study1 (n=60)		Study 2 (n=60)		Control group (n=120)				
	NO.	%	NO.	%	NO.	%			
Age (years):									
Mean± SD	52.47 ± 2.65		52.97± 2.94		53.10± 2.62		**F**	0.33	
Range	48.0 – 60.0		49.0– 62.0		48.0– 60.0		= 1.10	NS	
Gender:									
Male	26	43.3	26	43.3	56	46.7	$\chi 2$	0.87	
Female	34	56.7	34	56.7	64	53.3	= 0.26	NS	
Educational level:									
Illiterate	0	0.0	8	13.3	8	6.7	**$\chi 2$**	0.03	P1 0.003
Primary	2	3.3	4	6.7	6	5.0	=13.77	S	P2 0.15
Secondary	31	51.7	35	58.3	64	53.3			P3 0.19
University	27	45.0	13	21.7	42	35.0			
Marital status:									
Single	1	1.7	0	0.0	1	0.8	**$\chi 2$**	0.54	
Married	50	83.3	45	75.0	98	81.7	=3.10	NS	
Widowed	9	15.0	15	25.0	21	17.5			
Duration of diabetes (months)									
Mean± SD	4.33 ± 1.56		3.87± 1.53		4.32± 1.56		**K**	0.21	
Range	1.0 – 7.0		1.0– 7.0		1.0– 8.0		= 3.11	NS	
Smoking (Pre):									
Yes	23	38.3	17	28.3	46	38.3	**$\chi 2$**	0.37	
No	37	61.7	43	71.7	74	61.7	=1.95	NS	
Smoking (Post):									
Yes	6	10.0	8	13.3	43	35.8			P1 0.003
No	37	61.7	43	71.7	74	61.7	**$\chi 2$**	<0.001	P2 <0.001
Stopped	17	28.3	4	6.7	1	0.8	=57.57	HS	P3 0.001
Reduced number of cigarettes	0	0.0	5	8.3	2	1.7			

Note:

$\chi 2$ = Pearson Chi-Square test **F=** ANOVA- test K: Kruskal Wallis test

NS: Not significant (P value > 0.05) S: Significant HS: Highly significant

P1: comparison of study 1 group Vs. Study 2 group

P2: comparison of study 1 group Vs. control group

P3: comparison of study 2 group Vs. control group

Table (2): Mean and Standard Deviation of BMI and blood pressure measurements among studied groups pre and post intervention (n=240)

Medical data	Studied groups			ANOVA	P value	Post Hoc tests
	Study1 (n=60)	Study 2 (n=60)	Control group (n=120)			
	Mean± SD Range	Mean± SD Range	Mean± SD Range			
BMI (pre):	30.45 ± 1.81 26.0 – 35.0	30.08± 2.21 26.0– 34.0	30.23± 1.52 26.0– 34.0	0.64	0.52 NS	-------
BMI (post1):	28.23 ± 1.96 25.0 – 33.0	27.80± 1.58 23.0– 30.0	29.91± 1.46 25.0– 34.0	41.42	<0.001 HS	P1 0.14 P2 <0.001 P3 <0.001
BMI (post2):	25.45 ± 2.08 22.0 – 30.0	25.10± 2.03 20.0– 28.0	28.98± 1.72 24.0– 33.0	114.97	<0.001 HS	P1 0.31 P2 <0.001 P3 <0.001
BMI (post3):	22.48 ± 1.97 19.0 – 26.0	21.68± 1.77 19.0– 25.0	28.39± 1.58 23.0– 32.0	400.27	<0.001 HS	P1 0.01 P2 <0.001 P3 <0.001
Repeated measures ANOVA (P value)	663.0 (<0.001 HS)	450.0 (<0.001 HS)	416.26 (<0.001 HS)			
Systolic BP (pre):	149.92± 9.76 120.0– 170.0	145.92 ± 9.18 120.0 – 160.0	150.0± 9.09 120.0– 165.0	4.29	0.01 S	P1 0.01 P2 0.006 P3 0.95
Systolic BP (post1):	144.67± 9.64 110.0– 160.0	141.83 ± 9.20 110.0 – 155.0	148.38± 9.48 110.0– 160.0	10.15	<0.001 HS	P1 0.10 P2 <0.001 P3 0.01
Systolic BP (post2):	136.75± 7.69 110.0– 150.0	135.25 ± 7.99 110.0 – 145.0	143.38± 9.30 110.0– 160.0	22.46	<0.001 HS	P1 0.34 P2 <0.001 P3 <0.001
Systolic BP (post3):	131.67± 9.76 120.0– 140.0	130.25 ± 9.18 110.0 – 140.0	138.67± 9.09 120.0– 155.0	31.15	<0.001 HS	P1 0.31 P2 <0.001 P3 <0.001
Repeated measures ANOVA (P value)	142.88 (<0.001 HS)	129.83 (<0.001 HS)	138.88 (<0.001 HS)			
Diastolic BP (pre):	97.17 ± 8.14 80.0 – 110.0	97.75± 7.27 80.0 – 110.0	98.0± 5.73 80.0 – 110.0	0.30	0.74 NS	---------
Diastolic BP (post1):	92.42 ± 8.61 70.0 – 105.0	91.33± 7.0 70.0 – 105.0	95.0± 6.92 70.0 – 105.0	5.67	0.004 S	P1 0.42 P2 0.02 P3 0.002
Diastolic BP (post2):	87.50 ± 6.79 70.0 – 100.0	84.58± 5.98 70.0 – 95.0	92.79± 5.25 70.0 – 100.0	43.56	<0.001 HS	P1 0.007 P2 <0.001 P3 <0.001
Diastolic BP (post3):	83.67 ± 6.16 70.0 – 100.0	81.25± 4.66 70.0 – 90.0	92.33± 5.64 75.0 – 100.0	97.53	<0.001 HS	P1 0.01 P2 <0.001 P3 <0.001
Repeated measures ANOVA (P value)	104.95 (<0.001 HS)	160.63 (<0.001 HS)	75.45 (<0.001 HS)			
Pairwise comparisons	P <0.001a HS P <0.001b	P <0.001a HS P <0.001b	P <0.001a HS P <0.001b			

	HS P <0.001c HS P <0.001d HS P <0.001e HS P <0.001f HS	HS P <0.001c HS P <0.001d HS P <0.001e HS P <0.001f HS	HS P <0.001c HS P <0.001d HS P <0.001e HS P 0.18f NS			

P1: comparison of study 1 group Vs. Study 2 group
P2: comparison of study 1 group Vs. control group
P3: comparison of study 2 group Vs. control group
[a:] comparison of pre measurement Vs. post 1 measurement
[b:] comparison of pre measurement Vs. post 2 measurement
[c:] comparison of pre measurement Vs. post 3 measurement
[d:] comparison of post 1 measurement Vs. post 2 measurement
[e:] comparison of post 1 measurement Vs. post 3 measurement
[f:] comparison of post 2 measurement Vs. post 3 measurement

Table (3): Mean and Standard Deviation of total knowledge score among studied groups pre and post implementing self-directed management (n=240):

	Studied groups			ANOVA	P value	Post Hoc tests
	Study1 (n=60)	Study 2 group (n=60)	Control group (n=120)			
	Mean± SD Range	Mean± SD Range	Mean± SD Range			
Knowledge score (pre):	22.06 ± 0.25 22.0 – 23.0	23.03± 1.19 22.0 –26.0	22.25± 0.57 22.0 – 24.0	31.03	<0.001 HS	P1 <0.001 P2 0.09 P3 <0.001
Knowledge score (post):	63.35 ± 1.81 56.0 – 65.0	61.98± 3.70 53.0 –64.0	23.77± 2.15 22.0 – 28.0	6926.64	<0.001 HS	P1 0.004 P2 <0.001 P3 <0.001
Paired t test (P value)	157.18 (<0.001 HS)	67.95 (<0.001 HS)	9.71 (<0.001 HS)			

Figure (1): Distribution of the studied groups according to their knowledge about olive oil (n=240):

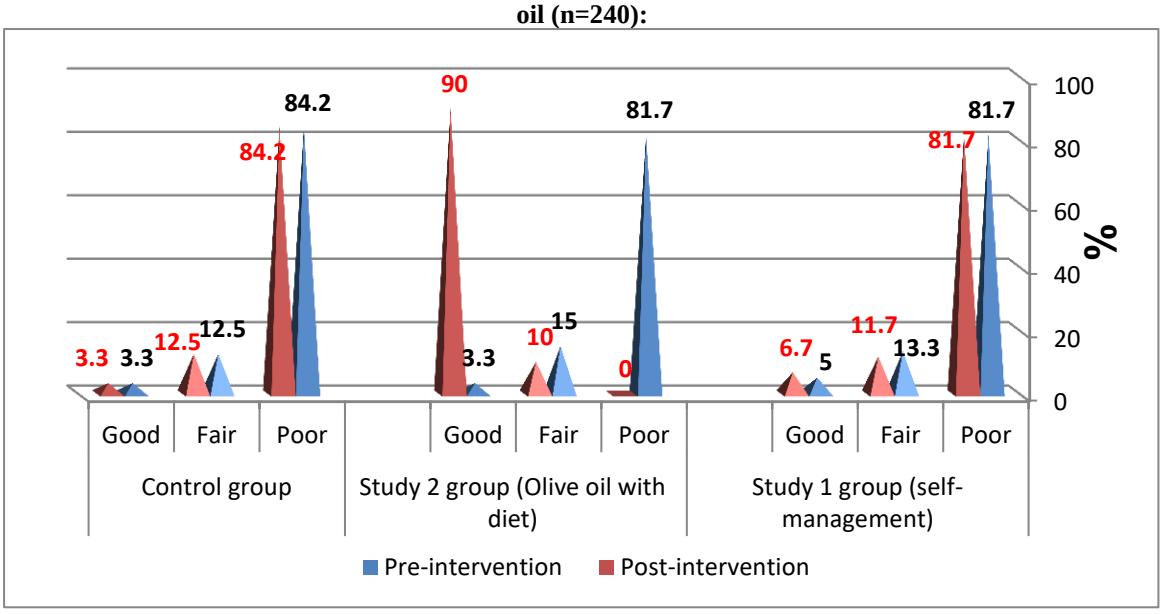

Table (4): Mean and Standard Deviation of laboratory investigations among studied groups pre and post implementing self-directed management (n=240):

	Studied groups			ANOVA	P value	Post Hoc tests
	Study1 (n=60)	Study 2 (n=60)	Control group (n=120)			
	Mean± SD Range	Mean± SD Range	Mean± SD Range			
Blood glucose level (pre):	262.80 ± 96.91 70.0 – 400.0	264.92± 93.76 70.0– 380.0	269.31± 76.69 70.0– 370.0	K= 2.02	0.36 NS	-------
Blood glucose level (post1):	236.67 ± 78.56 80.0 – 380.0	204.92± 56.69 90.0– 300.0	277.38± 68.23 80.0– 365.0	K= 65.42	<0.001 HS	P1 0.01 P2 <0.001 P3 <0.001
Blood glucose level (post2):	202.83 ± 61.72 70.0 – 300.0	175.33± 44.23 70.0– 270.0	258.68± 74.09 40.0– 335.0	K= 78.75	<0.001 HS	P1 0.02 P2 <0.001 P3 <0.001
Blood glucose level (post3):	167.17 ± 46.28 70.0 – 250.0	146.33± 25.74 70.0– 200.0	266.94± 63.27 70.0– 340.0	K= 125.12	<0.001 HS	P1 0.02 P2 <0.001 P3 <0.001
Repeated measures ANOVA (P value)	47.10 (<0.001 HS)	69.49 (<0.001 HS)	3.48 (0.03 S)			
Triglycerides (pre):	206.35 ± 23.91 160.0 – 300.0	207.42± 25.87 140.0– 300.0	196.04± 17.56 155.0– 260.0	7.63	0.001 HS	P1 0.78 P2 0.003 P3 0.001
Triglycerides (post1):	186.38 ± 21.17 155.0 – 299.0	183.38± 11.26 155.0– 210.0	193.60± 16.41 155.0– 255.0	8.66	<0.001 HS	P1 0.32 P2 0.007 P3 <0.001
Triglycerides (post2):	166.22 ± 10.61 145.0 – 190.0	166.0± 11.37 140.0– 195.0	189.43± 14.50 155.0– 250.0	98.34	<0.001 HS	P1 0.92 P2 <0.001 P3 <0.001
Triglycerides (post3):	146.68± 12.09 135.0– 200.0	144.62 ± 5.92 135.0 – 160.0	186.67± 13.02 155.0– 230.0	387.87	<0.001 HS	P1 0.32 P2 <0.001 P3 <0.001
Repeated measures ANOVA (P value)	148.98 (<0.001 HS)	244.59 (<0.001 HS)	126.04 (<0.001 HS)			
Cholesterol (pre):	232.20 ± 8.09 210.0 – 242.0	229.55± 9.70 200.0 – 242.0	231.34± 9.07 200.0 – 242.0	1.37	0.25 NS	---------
Cholesterol (post1):	219.50 ± 8.76 200.0 – 230.0	217.83± 8.75 200.0 – 230.0	223.17± 7.61 200.0 – 240.0	9.64	<0.001 HS	P1 0.26 P2 0.005 P3 <0.001
Cholesterol (post2):	207.08 ± 13.09 190.0 – 230.0	201.67± 10.76 190.0 – 225.0	216.13± 10.62 190.0 – 240.0	35.75	<0.001 HS	P1 0.009 P2 <0.001 P3 <0.001
Cholesterol (post3):	192.58 ± 11.47 175.0 – 220.0	187.50± 9.09 175.0 – 215.0	208.58± 13.80 175.0 – 230.0	71.22	<0.001 HS	P1 0.02 P2 <0.001 P3 <0.001
Repeated measures ANOVA (P value)	402.79 (<0.001 HS)	563.82 (<0.001 HS)	243.81 (<0.001 HS)			
Pairwise comparisons	P <0.001a HS P <0.001b	P <0.001a HS P <0.001b	P <0.001a HS P <0.001b HS P <0.001c HS			

	HS P <0.001c HS P <0.001d HS P <0.001e HS P <0.001f HS	HS P <0.001c HS P <0.001d HS P <0.001e HS P <0.001f HS	P <0.001d HS P <0.001e HS P 0.18f NS			

Continuous Table (4): Mean and Standard Deviation of laboratory investigations among studied groups pre and post implementing self-directed management (n=240):

	Studied groups			ANOVA	P value	Post Hoc tests
	Study1 (n=60)	Study 2 (n=60)	Control group (n=120)			
	Mean± SD Range	Mean± SD Range	Mean± SD Range			
LDL (pre):	152.65 ± 13.54 125.0 – 170.0	153.80± 12.90 125.0 – 170.0	153.80± 12.81 125.0 – 170.0	0.17	0.83 NS	-------
LDL (post1):	148.05 ± 14.62 120.0 – 165.0	145.23± 15.43 115.0– 169.0	153.78± 12.72 125.0– 170.0	8.48	<0.001 HS	P1 0.26 P2 0.01 P3 <0.001
LDL (post2):	117.67 ± 8.56 105.0 – 135.0	117.75± 8.89 105.0 – 135.0	153.68± 12.59 125.0– 170.0	330.14	<0.001 HS	P1 0.96 P2 <0.001 P3 <0.001
LDL (post3):	96.40 ± 3.35 85.0 – 105.0	94.63± 3.31 80.0– 100.0	153.39± 13.99 85.0– 170.0	967.79	<0.001 HS	P1 0.34 P2 <0.001 P3 <0.001
Repeated measures ANOVA (P value)	510.20 (<0.001 HS)	476.19 (<0.001 HS)	0.39 (0.55 NS)			
HDL (pre):	39.50 ± 3.32 35.0 – 46.0	41.65± 3.73 35.0 – 48.0	42.95± 4.59 35.0 – 60.0	14.19	<0.001 HS	P1 0.004 P2 <0.001 P3 0.04
HDL (post1):	44.10 ± 3.83 39.0 – 56.0	47.46± 5.09 40.0– 60.0	44.68± 4.85 35.0– 60.0	9.50	<0.001 HS	P1 <0.001 P2 0.43 P3 <0.001
HDL (post2):	54.03 ± 3.95 50.0 – 65.0	54.62± 4.74 50.0 – 65.0	46.69± 6.46 35.0– 70.0	53.14	<0.001 HS	P1 0.56 P2 <0.001 P3 <0.001
HDL (post3):	62.68 ± 4.04 55.0 – 70.0	65.90± 2.72 60.0– 70.0	49.31± 8.72 35.0– 80.0	156.23	<0.001 HS	P1 0.009 P2 <0.001 P3 <0.001
Repeated measures ANOVA(Pvalue)	556.17 (<0.001 HS)	592.60 (<0.001 HS)	76.78 (<0.001 HS)			
Pairwise comparisons	P <0.001[a] HS P <0.001[b] HS P <0.001[c] HS P <0.001[d] HS P <0.001[e] HS P <0.001[f] HS	P <0.001[a] HS P <0.001[b] HS P <0.001[c] HS P <0.001[d] HS P <0.001[e] HS P <0.001[f] HS	P <0.001[a] HS P <0.001[b] HS P <0.001[c] HS P <0.001[d] HS P <0.001[e] HS P <0.001[f] HS			

Table (5): Distribution of the studied groups regarding patient compliance (n=240):

	Studied groups									χ^2	P value
	Study1 (n=60)			Study 2 (n=60)			Control group (n=120)				
	NO N (%)	To some extent N(%)	Yes N(%)	NO N (%)	To some extent N(%)	Yes N(%)	NO N (%)	To some extent N(%)	Yes N(%)		
Post 1	28 (46.7)	31 (51.7)	1 (1.7)	34 (56.7)	23 (38.3)	3 (5.0)	04 (86.7)	14 (11.7)	2 (1.7)	38.47	<0.001 HS
Post 2	6 (10.0)	46 (76.7)	8 (13.3)	4 (6.7)	44 (73.3)	2 (20.0)	04 (86.7)	14 (11.7)	2 (1.7)	149.37	<0.001 HS
Post 3	0 (0.0)	16 (26.7)	44 (73.3)	0 (0.0)	18 (30.0)	2 (70.0)	04 (86.7)	14 (11.7)	2 (1.7)	192.77	<0.001 HS

Table (6): Mean and Standard Deviation of Patient's score of self- management practices among studied groups pre and post implementing self-directed management (n=240):

	Studied groups			Kruskal Wallis test	P value	Post Hoc tests
	Study1 (n=60)	Study 2 (n=60)	Control group (n=120)			
	Mean± SD Range	Mean± SD Range	Mean± SD Range			
Pre	2.35±3.91 0.0 – 16.0	2.21±4.38 0.0 – 16.0	1.33±3.87 0.0 – 20.0	5.73	0.06 NS	———
Post1	6.23±4.26 2.0 – 18.0	5.70±4.62 2.0 – 18.0	1.76±4.22 0.0 – 20.0	110.56	<0.001 HS	P1 0.50 P2 <0.001 P3 <0.001
Post2	11.20±4.61 2.0 – 18.0	11.10±3.99 2.0 – 18.0	2.43±4.84 0.0 – 20.0	129.01	<0.001 HS	P1 0.90 P2 <0.001 P3 <0.001
Post3	18.66±3.0 12.0 – 20.0	18.66±3.0 12.0 – 20.0	3.01±5.73 0.0 – 20.0	181.22	<0.001 HS	P1 1.0 P2 <0.001 P3 <0.001

Table (7): Mean and Standard Deviation of complications frequency among studied groups pre and post implementing self-directed management (n=240):

	Studied groups			Test of sig.	P value	Post Hoc tests
	Study1 (n= 60)	Study 2 (n=60)	Control group (n=120)			
	Mean± SD Range	Mean± SD Range	Mean± SD Range			
Frequency of hypoglycemia(pre):	2.98 ± 0.85 2.0 – 5.0	3.15± 0.86 2.0 – 5.0	3.07± 0.85 2.0 – 5.0	F=0.56	0.56 NS	-------
(post1):	2.17 ± 0.80 1.0 – 4.0	2.17± 0.80 1.0– 4.0	2.56± 0.92 1.0– 5.0	F=6.11	0.003 S	P1 1.0 P2 0.005 P3 0.005
(post2):	0.90 ± 0.60 0.0 – 2.0	0.78± 0.55 0.0 – 2.0	1.51± 0.87 0.0– 4.0	K=41.29	<0.001 HS	P1 0.38 P2 <0.001 P3 <0.001
(post3):	0.18 ± 0.39 0.0 – 1.0	0.12± 0.32 0.0– 1.0	0.68± 0.77 0.0– 3.0	K=39.85	<0.001 HS	P1 0.54 P2 <0.001 P3 <0.001
Repeated measures ANOVA (P value)	278.68 (<0.001 HS)	341.87 (<0.001 HS)	394.95 (<0.001 HS)			
Frequency of hyperglycemia(pre):	2.32 ± 1.08 1.0 – 5.0	2.43± 1.11 1.0 – 5.0	2.39± 1.07 1.0 – 5.0	K=0.44	0.80 NS	_____
(post1):	1.30 ± 0.67 0.0 – 3.0	1.32± 0.65 0.0 – 3.0	1.50± 0.73 0.0 – 4.0	K=3.85	0.14 NS	_____
(post2):	0.67 ± 0.57 0.0 – 2.0	0.60± 0.55 0.0 – 2.0	0.89± 0.69 0.0 – 3.0	K=8.52	0.01 S	P1 0.56 P2 0.02 P3 0.004
(post3):	0.27 ± 0.44 0.0 – 1.0	0.20± 0.40 0.0 – 1.0	0.46± 0.57 0.0 – 2.0	K=10.63	0.005 S	P1 0.47 P2 0.01 P3 0.001
Repeated measures ANOVA(P value)	166.57 (<0.001 HS)	175.71 (<0.001 HS)	228.78 (<0.001 HS)			
Pairwise comparisons	P <0.001a HS P <0.001b HS P <0.001c HS P <0.001d HS P <0.001e HS P <0.001f HS	P <0.001[a] HS P <0.001[b] HS P <0.001[c] HS P <0.001[d] HS P <0.001[e] HS P <0.001[f] HS	P <0.001[a] HS P <0.001[b] HS P <0.001[c] HS P <0.001[d] HS P <0.001[e] HS P <0.001[f] HS			

Table (8): Correlation between patient self-directed management implementation and incidence of DM complications among study group 1(n=240):

	Frequency of hypoglycemia (Pre-intervention)		Frequency of hyperglycemia (Pre-intervention)	
	r (spearman correlation coefficient)	P value	r (spearman correlation coefficient)	P value
Self-management (Pre-intervention)	-0.03	0.81 NS	-0.01	0.90 NS
Olive oil knowledge (Pre-intervention)	-0.13	0.30 NS	-0.20	0.12 NS

Table (9): Correlation between patient self- directed management implementation and incidence of DM complications (post 3) among studied groups (n=240):

	Frequency of hypoglycemia (Post-intervention3)		Frequency of hyperglycemia (Post-intervention3)	
	r (spearman correlation coefficient)	P value	r (spearman correlation coefficient)	P value
Directed self-management (Post-intervention3) Study group 1	-0.48	<0.001 HS	-0.43	<0.001 HS
Directed self- management (Post-intervention3) Study group 2	-0.67	<0.001 HS	-0.44	<0.001 HS
Directed self- management (Post-intervention3) Control group	-0.29	0.001 HS	-0.18	0.04 S

Discussion:

The nurse plays a crucial role in the management of T2 DM by encouraging patients to engage in self-management activities that prevent diabetes-related complications. There are several significant approaches for treating T2 DM and preventing complications, including food modification, physical activity for weight loss, and glucose monitoring to prevent acute problems. The purpose of the study was to assess the effect of self- directed management implementation on of short-term complications in type II diabetic patients.

This study demonstrated that more than half of all studied groups were female at the aged above fifty years old; this result was supported by Ciarambino, et al., (2022) who studied Influence of Gender in Diabetes Mellitus and Its Complication and documented that women with type 2 diabetes more than men after the age of menopause and in old age; and there was statistically significant differences among studied groups related to level of education, this result was agreed with Steele, et al., (2017), they studied Education achievement and type 2 diabetes—what mediates the relationship in older adults?, and said that presence of the relationship between education level and incidence of T2DM.

The study results informed that progressing in mean of the knowledge scores about diabetes, its complications and self- management practices among both study 1&2 while most of control group had low knowledge score throughout study phases with highly statistical differences; these findings were in line with Hailu, et al., (2019) who studied Diabetes Self-Management Education (DSME): Effect on Knowledge, Self-Care Behavior, and Self- Efficacy among Type 2 Diabetes Patients in Ethiopia: A Controlled Clinical Trial. Diabetes, Metabolic Syndrome and Obesity, and identified that patients recently diagnosed with diabetes lacked knowledge of the disease's pathophysiology and management prior to the implementation of a self-management programme, which

resulted in a significant increase in the mean diabetes knowledge score and skills despite the lengthy time interval between educational sessions. Moreover, the majority of study 2 had a good level of olive oil knowledge post intervention, but the majority of study1 and the control group had a poor level of olive oil knowledge post intervention; these outcomes reinforced by Farag, et al., (2023) who studied Outcomes of diabetes self-management education on glycemic control among diabetic patients, and expressed that; diabetic patients needed to educate skills and risk-reduction behaviors as taking healthy eating including olive oil and compliance with medication. So, the first hypothesis was supported.

The current study found that significant improvement in blood glucose among study2 more than study1 and control group throughout different measurements especially post3; these results were in line with Dehghani, et al., (2023) who studied Effect of extra virgin olive oil consumption on glycemic control: A systematic review and meta-analysis. Nutrition, Metabolism and Cardiovascular Diseases and documented that olive oil had hypoglycemic effects among T2DM with insulin resistance. Additionally low density lipoprotein (LDL) level and cholesterol level decreased among olive oil group if compared with who was study group 1 and control group throughout different measurements especially post3. Furthermore high density lipoprotein (HDL) increased among study 2, who perform directed self-management with adding olive oil in their diets than study1, who practice only self- directed management and control group, who doing routine management of T2DM, these results were similar with Rámila, et al., (2023) they studied Olive pomace oil can improve blood lipid profile: a randomized, blind, crossover, controlled clinical trial in healthy and at-risk volunteers and approved that; olive oil's hypolipidemic effect (increase in (HDL) and decrease in (LDL)) makes it an essential component of T2DM and the prevention of diabetes' cardiovascular consequences. So, the fourth hypothesis was supported.

The existing results described that statistically significant reductions in BMI, systolic and diastolic blood pressure were observed in study 2 (apply directed self-management and add olive oil to meals) as compared to study 1 (implement directed self-management alone) and the control group. These results were in linked with Silveira, et al., (2022) who studied Positive Effects of Extra-Virgin Olive Oil Supplementation and DietBra on Inflammation and Glycemic Profiles in Adults With Type 2 Diabetes and Class II/III Obesity: A Randomized Clinical Trial, and reported a significant decrease in BMI and weight in the study group compared to other groups. So, the fourth hypothesis was supported.

The existing study exposed that Throughout various study intervals, a greater proportion of patients from study group 1 and 2 followed all self-management instructions and performed all self-management practices, so their glycemic level and complications were managed, especially with their compliance, which shifted from non-implementation to partial implementation in intervention3, whereas the majority of patients in the control group did not perform and comply with disease-controlling practices, these results strengthened with Zhu, et al., (2022) who studied

Use of health locus of control on self-management and HbA1c in patients with type 2 diabetes and revealed that; the self-management group by time interaction effects were statistically significant on the overall level of self-management and compliance with evidence to improve diabetic control and prevent diabetes-related complications for all diabetic patients from the time of diagnosis by the effects of active learning and follow-up of diabetic patients. Nurses' active learning and follow-up of diabetic patients are essential to the success of the directed self-management program. So, the second hypothesis was supported.

The findings of study indicated that applying self-management practices such as eating a healthy diet based on proper daily requirements, physical activity, monitoring level of blood glucose, compliance for both self-management practices with medication intake and risk reduction behaviors so that the objectives of diabetes management and reducing frequency of T2DM complications such as hypoglycemia and hyperglycemia that appeared by post3 years can be achieved., these findings were supported with Farag, et al., (2023) who studied Outcomes of diabetes self-management education on glycemic control among diabetic patients, and said that the patient's acceptance of the therapies contained in directed self-management and their effectiveness by continuously changing their behaviors to control their symptoms, promote well-being, and avoid hyperglycemia and hypoglycemia as acute consequences of T2DM. So, the third hypothesis was supported.

Conclusion

Implementing of self- directed management practices with olive oil as part of a health dietary plan is likely to produce better Type II Diabetes Mellitus outcomes and reduce short term complications when combined with physical exercise.

Recommendation

Replication of the study in another setting and using a larger sample size to generalize the search results. Self-management program can be applied as a hospital routine care for patient with diabetes.

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