Health Education Program on Foot Self-Care Behavior among Elderly with Type 2 Diabetes at Primary Health Care Centers

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ABSTRACT

Background: Foot self-care interventions have a role in the early prevention and detection of diabetic foot among the elderly which has become a challenge that continues to rise and worsen. **Aim**: Explore the effect of health education program on foot self-care behavior among elderly with type 2 diabetes at primary health care centers. **Subjects and method**: A quasi-experimental research design was utilized in this study with pre and post-tests. The current study was conducted at the five healthcare centers located in Port Said governorate, randomly selected and providing health care and follow-up for elderly patients with diabetes. A purposive sample of 71 elderly patients with type 2 diabetes. **Tools**: Three tools were employed for the collection of data, including Diabetic elderly patients' knowledge questionnaire about foot care and, Diabetic Foot self-care behavior scale (DFSCBS) to determine diabetic patients' foot self-care behaviors. Foot care outcome expectations (FCOE) to measure the elder's confidence level. **Results:** It was indicated that 97.2% of the studied diabetic elderly patients' had satisfactory knowledge scores post-program implementation, while, the mean score of their foot self-care practice improved to 94.80 ± 4.71 post-program implementation as well as the mean score of diabetic elderly patients' foot care outcome expectation is increased to 94.84 ± 6.85post program implementation, with a highly statistically significant difference ($p<0.001$*)**. Conclusion:** Health education programs have a positive significant impact on foot self-care behavior among type 2 diabetic elderly. **Recommendation:** Conduct periodic prevention guideline program and reduction sessions regarding the prevention of foot ulcers in diabetic elderly patients.

Keywords: Behavior, Self-Care, Type 2 Diabetes, Health, Education, Elderly, Foot,

INTRODUCTION

Diabetes is a chronic complex disease that requires continuous care, proper control as well as and multifactorial strategies for reducing the risk of complications, also there is evidence from various studies that good metabolic control for type 2 diabetes can delay the onset and progression of these complications, which are divided into micro vascular and macro vascular and with increasing age and duration of disease, both micro and macro vascular complications are more prevalent in the elderly (Küççük & Selçuk Tosun, 2022).

Diabetes mellitus is a major public health issue and is the main cause of morbidity and mortality worldwide. At the time of diagnosis, many elderly patients with type 2 diabetes (T2D) have one or two risk factors for diabetic foot diseases, such as diabetic peripheral neuropathy (DPN) and diabetic foot ulcers (DFUs) (Sari et al., 2022).

In Egypt, the Central Agency for Public Mobilization and Statistics (CAPMAS), reported the number of type II diabetics reached 39 million and about 8.6 million of them were elderly persons. Egypt ranks eighth globally for the prevalence of diabetes and is expected to reach sixth globally to double the number by 2045 if it is not well controlled (Central Agency for Public Mobilization and Statistics, 2019).

Additionally, foot health problems are common in the elderly due to pathological changes in their feet, and difficulties involved in taking care of their extremities. The prevalence of diabetic type 2 foot ulcers is high in Egypt, it is estimated from a recent study conducted among diabetics in Egypt, that 29.3% of diabetics had foot ulcer disease; 63.3% had vascular complications, and neuropathy was reported in 88.0% of them (Galal, Khairy, Taha & Amin, 2021).

Diabetic foot is defined as infection, ulceration, or destruction of the foot tissues of a person with currently or previously diagnosed diabetes mellitus, usually accompanied by neuropathy and/or Peripheral Artery Disease (PAD) in the lower extremity (Everett, Mathioudakis, and Update, 2018).

Diabetic foot problems are one of the most common chronic complications of type 2 diabetes that has a tremendous economic and social impact on individuals, families, and the health system in developing and developed countries. Improper foot care in diabetic type 2 patients can lead to many complications such as infection, ulcerations, gangrene, and amputations (Al-Ayed, Ababneh, Robert, Salman, Al Saeed, & Al Dawish, 2021). So, all

elderly with type II diabetes should do routine foot exams by the screening clinician annually to identify diabetic foot complications prevent DFU, or re-ulceration of a DFU, and promote foot health (Chicharro, Pomares, Ortega, Coheña, and Gijon, 2020).

Furthermore, most elderly with type 2 Diabetic type 2-foot complications associated with physical restrictions that, negatively affect their quality of life and further worsen depression, which can be prevented through major changes in behavior, which includes knowledge, skills, and confidence to make improvements in self-care behavior and deal with associated psychological aspects, which prevent and delay potential complications as risk of foot ulceration (Lael-Monfared, 2023).

Self-care is crucial for diabetes regulators and its routines are essential not only for people who already have diabetes but also for those who are at risk of contracting this disease in the prediabetic foot population. It can be defined as efforts made by those who have diabetic feet or are at risk of getting the condition to effectively manage it on their own (Alharbi, and Sulaiman, 2022). The elderly with diabetes must adhere to many self-care regimens recommended and should prioritize nutrition, exercise, foot care, blood sugar testing, and adherence to their treatment plan. Treatment adherence diminishes the patient's risk of developing diabetes complications and death by necessitating considerable motivation and consistent effort (Mekonnen & Hussien, 2021).

In the field of diabetic foot prevention and self-care, community health nurses have a critical role in educating, preventing, and treating foot ulcers for the elderly. They oversee detecting any changes in skin and foot sensation, as well as providing foot care, dressing, and implementing new technologies (Al-Ghazaly, Al-Ahwal & Zagloul, 2020).

As care providers, community health nurses should consider client-centered care and effective communication with clients and their families through health education programs. They should instruct diabetic elderly patients about the increased risk of lower extremity complications and refer those patients to a routine schedule of foot care. Promptly preventive foot care should be performed as early as possible to reduce the number of lower limb infections and future amputations (Kim and Han, 2020).

Significance of the study

Foot health problems are common in the elderly diabetic type 2 due to pathological changes in their feet, and difficulties involved in taking care of their extremities are at risk for foot ulceration as it can lead to many complications such as infection, ulcerations, gangrene, and amputations, and disability (Mehmood, Parkar, Mustafa, Mustafa, Makin & Alawadi, 2021).

According to systematic research comprising more than 800,000 contributors diagnosed with DM worldwide, the global prevalence of Diabetic foot ulcers, (DFUs) is estimated to be 6.3 percent. Furthermore, the findings revealed a greater prevalence of DFUs in Africa (7.2%) than in Asia (5.5%) or Europe (5.2%). (3 percent). According to research conducted in Egypt, DFUs are present in 6.1% to 29.3% of diabetes patients (Galal et al, 2021). In Egypt, there are about 90% of the people having diabetes do not receive education on diabetic foot problems and care as well as and it has been thought that every 30 seconds, a lower limb is lost someplace in the world as a result of diabetes.

Moreover, a limited number of studies have investigated the self-care behavior of diabetic foot in Egypt (Abdelsalam et al., 2020). Therefore, the current study was carried out to evaluate the effect of health education program on foot self-care behavior of elderly with type 2 diabetes at primary health care centers.

AIM OF THE STUDY

This study aimed to explore the effect of health education program on foot self-care behavior among elderly with type 2 diabetes at primary health care centers, through:

Objectives of the study:

1. Assess knowledge of elderly with type 2 diabetes about foot care.

2. Assess the foot self-care behavior of elderly with type 2 diabetes.

3. Design a health education program about foot self-care behavior for elderly with type 2 diabetes.

4. Implement a health education program about foot self-care behavior for elderly with type 2 diabetes at primary health care centers.

5. Evaluate the effect of health education program on foot self-care behavior among elderly with type 2 diabetes at primary health care centers.

Research Hypothesis:

H 1: Health education program will have a positive significant effect on foot self-care behavior among type 2 diabetic elderly patients.

H 1: Foot self-care behavior among type 2 diabetic elderly patients will be improved after the implementation of the health education program.

SUBJECTS AND METHODS

Technical design

The technical design for this study includes a description of the research design, setting, subjects, and tools of data collection.

Research Design

A quasi-experimental research design with one group Pre and Post-test approach was utilized in this study.

Study settings

The current study was conducted at the five healthcare centers. All healthcare centers include chronic disease clinics that provide health care and follow-up for elderly patients with diabetes. They are located in the Port Said governorate. Therefore, one primary health care center was randomly selected from each district, namely: El-Manakh Center representing the El-Manakh district; Fatima Zahra Center representing the El-Dawahy district; Omar bin El-Khattab Center representing the El-Zohur district; and Seha Awel center representing El Shark district.

Study Subjects

A purposive sample of 71 elderly patients with Type 2 diabetes who attended the previously mentioned setting was included after meeting the following inclusion criteria: elderly patients aged 60 years or more who had been diagnosed with Type 2 diabetes, able to communicate and perform daily activities independently.

Sample size justification:

The sample size estimation was carried out using the hypothesis testing of two population means formula (Aday & Cornelius, 2006). The sample size considered the standard errors associated with confidence intervals (95% = 1.96) (2-tailed) and power (80% = 0.842) (Aday & Cornelius, 2006). Based on a previous study, the mean difference in the foot self-care score (baseline: 32.32±6.76) and (post-intervention: 36.22±6.95) was used (Chen et al., 2011). The calculated sample size was adjusted for design effect; assuming a cluster size of 6 and an intra-cluster correlation of 0.05. This means 59 participants are needed for the group to participate in this study. However, an additional number of participants were required to retain 20% of potential attention. Therefore, a minimum of (**71** elderly patients with Type 2 diabetes) is considered an adequate number to recruit for a dropout rate and potential of attrition.

Data Collection Tools

Tool I: A Structured Interview sheet about type 2 elderly diabetic patients. It consisted of two parts:

Part (1) is divided into two sections, the **first section** is concerned with sociodemographic characteristics of the studied diabetic elderly it includes (8) items such as age, gender, marital status, residence, educational level, number of children, occupational status, and monthly income. In addition, the **second section** includes (8) questions that cover data related to elderly patients' medical history and smoking habits such as (type of diabetes, duration of diabetes, treatment of diabetes, presence of other chronic diseases, received diabetes education, smoking status, family history of diabetes and recent hospitalization).

Part (2): Diabetic elderly patients' knowledge about foot care:

This structured interview sheet was developed by Desalu et al., (2011) in an English language then the researcher translated it into simple Arabic language and back to English. It was used to assess the elderly patients' knowledge about foot care. It is composed of 12 types of questions with yes or no answers that were collected by the researcher through interviewing the elderly, which covered the following items: its complications, diabetic foot ulcer, and its risk factors, signs of having foot infection, foot ulcer treatment, and foot care.

Scoring system

According to the answers collected from the diabetic elderly, a scoring system was applied to interpret the elderly' knowledge assessment. The studied patients' knowledge was checked and compared with the pre-designed model answer, and accordingly, their knowledge was categorized into; a score of one for (yes) answers, while a zero score was given for (no) answers. These scores were converted into mean, standard deviation, and percent scores. The knowledge of the elderly patients was considered satisfactory if the percent score was equal or more than 50%, of the total scores and unsatisfactory if the percent score was less than 50% of the total scores.

Tool II: Diabetic Foot self-care behavior scale (DFSCBS) (pre, post format):

It was adopted by Chin–Huang, (2013) in an English language and translated by the researcher into simple Arabic language and back-translated to English. This scale was used to determine diabetic patients' foot self-care behaviors. The scale is composed of 16 items as the elderly can examine their feet, wash between their toes, and dry between their toes after washing their feet.

Scoring system:

The Diabetic Foot self-care behavior scale (DFSBS) consists of 16 items divided into two parts: In the first part, the responses will be rated on the number of days patients performed a certain behavior for one week (0 for never, 7 for every day they performed the activity). In the second part, the responses will be rated by the frequency with which patients perform a certain behavior in general, from never (0) to always (5). The responses will be rated as a 5-point Likert scale [never/ 0 day per week (1), rarely/ 1-2 days per week (2), sometimes/ 3-4 days per week (3), often/ 5-6 days per week (4) and always/ 7 days per week (5)] with total possible scores of 16 to 80. A higher score of more than 40 indicated good foot self-care behavior.

Tool III: Foot care outcome expectation (FCOE):

This scale was developed by Wu et al., (2008) in an English language and translated into the Arabic language by the researcher to measure the participant’s confidence that the desirable results can be achieved if they perform proper foot self-care behavior. It had seven items: keep hygiene (one item), keep toes always dry (two items), protect feet from injury (three items) protect feet from injury (four items) check feet for cuts, scratches, blisters,

redness (five items) putting lotion when feet dry (six-item) judge when needs treatment by a doctor (seven-item).

Scoring System:

Each sub-item in the scale is rated on a 7-point Likert-type: strongly disagree (1), to strongly agree (7). The score ranges from 7-49; a higher score indicates that the participant has a high self-confidence that the foot self-care behavior he/ she performed will produce a good effect.

Operational Design:

The operational design included the preparatory phase, pilot study, validity of the study tool, reliability of the study tool, and fieldwork.

Preparatory phase

This phase included reviewing literature related to health education program on foot self-care behavior of the elderly with type 2 diabetes. This served to develop study tools for data collection. During this phase, the researcher also visited the selected places to be acquainted with the staff and the study settings. The tools were under supervisors' guidance and experts' opinions will be considered.

Content validity of the study tools:

The content validity of the study tools was assessed and revised by a panel of seven experts in the field of community health nursing (Port Said University). It was conducted to test the tools for appropriateness, comprehensiveness, relevance, and clearance. Their opinions are elicited regarding the tool format, layout, and consistency. So, the required were done according to their suggestions in the form of adding an interpretation at the end of the practical questions related to the practice of DFSBS to illustrate if their foot self-care behavior was good or poor. This phase of proving the validity of the study tool continued for one month.

Reliability of the study tools:

The internal consistency of the developed tools was tested by using Cronbach's alpha coefficient test by a statistician to assess the reliability of the tools, for the whole questionnaire. Tool (I) was reliable as r = 0. 73, Tool (II) was reliable as r = 0. 73, and Tool

(III) was reliable as r=0. 0.92 which indicates excellent reliability. This phase of ascertaining the reliability of the study tools was conducted within one month.

Pilot study

A pilot study was undertaken before starting the data collection phase. It was carried out with 10% of the total number of study samples (seven diabetic elderly patients). They were excluded from the study sample, and it took 15 days from the beginning of February to the middle of February. The purpose of the pilot study was to test the feasibility and applicability of the tools. It also helped to find out any obstacles and problems that might interfere with data collection.

Fieldwork

Data collection period

- Data collection started and continued for 6 months from the beginning of March 2023 to the end of August 2023. The researcher visited the previously mentioned study setting, two days/week (Monday & Tuesday).
- The researcher began by introducing herself to type 2 diabetic elderly patients and providing a brief overview of the study's purpose and scope. To collect the elderly patients' database line each patient was interviewed individually after taking their oral consent to contribute to the study before applying to the educational program.
- Data collection was conducted through four phases (assessment phase, planning phase, implementation phase, and evaluation phase).

1) Assessment phase

- Each diabetic patient was interviewed individually before applying awareness and educational program to collect patients; 'baseline, medical history, or clinical data using the study.
- Assessment of type 2 diabetic patients' knowledge about diabetes including diet, exercise, blood glucose level, and self-care activities using **Tool I**.
- Determining foot self-car levels of diabetic patients' type 2 diabetes patients in primary health care centers **Tool II**.
- Identifying type 2 diabetic patients’ foot care outcome expectations concerning (keeping hygiene, keeping toes always dry, protecting feet from injury,

protecting feet from injury, checking feet for cuts, scratches, blisters, and redness, putting lotion when feet dry, judging when needs treatment by a doctor) **Tool III**.

2) Planning phase

- Based on the findings of the assessment phase, goals, priorities, and expected outcomes were formulated to meet diabetic patients' knowledge deficits and practical needs regarding foot self-care for type 2 diabetes.
- In this phase, the educational program covered three sessions planned by the researcher for diabetic patients to provide them with knowledge about foot self-care for type 2 diabetes.

The general aim of the educational program:

To explore the effect of health education program on foot self-care behavior among elderly with type 2 diabetes at primary health care centers. A booklet containing the content of the program was designed by the researcher, it was written in a simple Arabic Language and supported by photos and illustrations to be distributed to study participants by the end of the program to help them understand the content.

The specific objective of the educational program:

At the end of the educational program, each elderly type 2 diabetic patient will be able to:

- Define diabetes, symptoms, types, causes, complications, and lines of treatment.
- Identify healthy nutrition for diabetics.
- Prevent complications of diabetes.
- Recognize preventive measures for a foot ulcer.
- Compliance with medication regimen.
- Monitor their blood glucose.
- Perform physical activity.

The content of the program was carried out as the following:

A. Two sessions about theoretical knowledge:

1. **First session**: at the beginning of this session, the researcher introduced herself and explained the objective of this educational session. It covered the theoretical part of type 2 diabetes.

2. **Second session**: It described diabetic foot self-care, its components, and preventive measures for a foot ulcer.

B. One practical session about:

3. **Third session**: This session included training of the studied elderly on the practice of their foot self-care behaviors, self-confidence level, applying all aspects of foot self-care, and re-demonstration on the implementation of the DFSB scale tool.

3) Implementation phase

1) The program was implemented in three sessions, two theoretical sessions and one practical session. Each session was taken in 30-40 minutes including 10 minutes for open discussion and take feedback from participants. The researcher evaluated type 2 diabetic patients' knowledge, self-care, and foot care outcome expectations (pre-and post) implementation of the educational program using tools II, and III.

2) Before beginning the educational program, each group was explained the educational program (introduction, its importance, training plan, and learning objectives).

3) The elderly diabetic patients studied were divided into groups; (7 groups) each one consisting of 10 to 11 patients.

4) The program was implemented for each group three days/ week from 9 a.m.-2 p.m. to complete three sessions over three weeks.

5) The educational program was presented in a clear and concise form, following the principles of adult learning, focusing on interactive learning and active participation. It was implemented using different teaching methods such as lectures, group discussion, brainstorming, demonstration, and re-demonstration of practice. In addition, different audiovisual materials were used as PowerPoint, pictures, and handouts to facilitate the teaching of each topic. Moreover, the educational booklet was given to each participant to attract attention, motivate, and help with reviewing at home.

4) Evaluation phase

The effectiveness of the program was based on assessing the improvement in their knowledge, and self-care activities by using the previous tools **II and III**. This was achieved

by comparing the pretest with the post-test which was done immediately after the implementation of the program.

Administrative Design

Before taking any step in the study, an official letter from the Dean of the Faculty of Nursing, Port Said University was sent to the Director of primary health care centers in Port Said City requesting his permission and cooperation to conduct the present research after explaining the intention of the study. In addition, approval was received from the participants themselves, after an explanation to each of them of the purpose of the study.

Ethical considerations

- An approval was taken from the Scientific Research Ethics Committee of the Faculty of Nursing; Port Said University (Code Number: NUR (13/3/2022) (11) Moreover, verbal consent was obtained from each studied elderly diabetic patient after a complete description of the purpose and nature of the study. Emphasizing confidentiality of the collected data and anonymity were strictly maintained through a code number affixed to each studied patient questionnaire. Voluntary participation of the studied patient was confirmed as well-informed that they have the freedom to withdraw from the study at any phase without any responsibility. Moreover, the process of data collection didn't disturb the harmony of the work of the above-mentioned setting.

Statistical Design

Data analysis was carried out using Statistical Package for Social Sciences (SPSS) version 25.0 (IBM Corp, Armonk, NY, USA). The demographic characteristics of the studied elderly were described using descriptive statistics. Knowledge, self-care behavior, and self-confidence level of the studied elderly regarding diabetic foot care were classified into satisfactory and unsatisfactory knowledge levels in addition to, good or poor self-care behavior while self-confidence level was high or low and each level of them was represented in numbers and percentages. An independent sample T-test was used to identify differences between pre-and post-program implementation scores. The significance level was considered at P-value < 0.05

RESULT

Table (1) The study results portray that 47.9 % of elderly patients with type 2 diabetes aged between 61 to 65 years old, and 59.2 % of them were male. Regarding marital status, 66.2% of them were married. Concerning educational levels, 31% of elderly patients had secondary education, while 25.4% were Illiterate. Also, this table reveals that 83.1% of the studied elderly patients lived in urban areas, and 85.9% of them did not work in any occupations. Finally, about 74.6% of them did not have enough monthly income.

Table (2) illustrates the distribution of the sample studied according to the history of disease and smoking habits. Besides, 42.2 % of them were diagnosed with diabetes for one to five years, and 74.6% of them were treated with oral medication. Furthermore, 62% of the elderly patients studied suffered from other chronic diseases. Also, it was clear that 52.1% of the studied elderly patients had no complications of diabetes, while (16.9% and 12.7%) of them had neuritis and cataracts in the eye respectively. Additionally, it was found that 88.7% of the subjects studied did not receive any health educational program regarding diabetes. Regarding current smoking, it can be seen that 78.9% of the studied elderly patients did not smoke.

Table (3) these findings indicate that 85.9% of the studied diabetic elderly patients had satisfactory total knowledge scores pre-program implementation and the percentage increased to 97.2% post-program implementation with a statistically significant difference found between diabetic elderly patients' knowledge pre-post phase of program implementation ($p<0.001$*).

Table (4) clarifies that the total mean score of diabetic elderly patients practicing diabetic foot self-care activities was Mean±SD=34.09±15.35 preprogram implementation which improved to Mean±SD=94.80±4.71 post-program implementation, with a highly statistically significant difference at ($p < 0.001$*).

Table (5) it was clearly from this table that, the mean score of diabetic elderly patients' foot care outcome expectation was Mean±SD=53.93±12.95 preprogram implementation which increased to Mean±SD=94.84 ± 6.85 post program implementation, with a highly statistically significant difference at ($p < 0.001$*).

Table (6) regards correlations between elderly patients' knowledge of foot care, the practice of foot self-care behavior (FSCB), and foot care outcome expectation (FCOE) pre- and post-program implementation. The result shows that there were significant positive

correlations between the above variables and pre- and post-program implementation phases with highly statistically significant differences respectively at ($p < 0.001$*).

Table (7) proves that there was a statistically significant difference between the educational level of the studied elderly patients and their levels of knowledge about foot care in the immediate post-program implementation phase at ($p= 0.031$*).

Table (1): Distribution of the sample studied according to their demographic characteristics (n=71)

Items	No.	%
Age in year		
61:65	34	47.9
66:70	17	23.9
>70	20	28.2
Mean ±SD	**59.01± 1.058**	
Gender		
Male	42	59.2
Female	29	40.8
Marital status		
Married	47	66.2
Widowed	22	31.0
Divorced	2	2.8
Education level		
Illiterate	18	25.4
Read and write	12	16.9
Primary	6	8.5
Preparatory	6	8.5
Secondary	22	31.0
University	7	9.9
Residence		
Rural	12	16.9
Urban	59	83.1
Occupational		
Work	10	14.1
Don`t work	61	85.9
Monthly income		
Enough	18	25.4
Not enough	53	74.6

Table (2): Distribution of the studied sample according to their medical history (n=71).

Items	No.	%
Duration of diabetes (years)		
1-5	30	42.2
5-10	17	23.9
10-15	14	19.7
15-20	6	8.4
>20	4	5.6
Treatment of diabetes		
Oral medication	53	74.6
Insulin	17	23.9
Diet control	1	1.4
Presence of any other chronic diseases		
No	27	38.0
Yes	44	62.0
Presence of complications of diabetes		
No	37	52.1
Cataract on the eye	9	12.7
Knee infection	3	4.2
Kidney disease	1	1.4
Heart complications	5	7.0
Problems with the blood vessels of the foot	2	2.8
Neuritis	12	16.9
Finger amputation	2	2.8
Received health educational program about diabetes		
No	63	88.7
Yes	8	11.3
Current smoking		
No	56	78.9
Yes	15	21.1

Table (3): Total scores of diabetic elderly patients' knowledge regarding foot care pre- and post-program implementation (n = 71).

Items	Pre		Post		Test of Sig (Paired t-test)	P
	No.	%	No.	%		
Unsatisfactory <50%	10	14.1	2	2.8	t= 6.992*	<0.001*
Satisfactory ≥50%	61	85.9	69	97.2		

t: Paired t-test p: p value for comparing between Pre and Post
*: Statistically significant at p ≤ 0.05

Table (4): Total mean scores of diabetic elderly patients' practice about foot self-care behavior Scale pre- and post-program implementation (n = 71).

Items	Pre	Post	Paired t-test	
	Mean ±SD		T	P
Diabetes foot self-care behavior score	34.09 ± 15.35	94.80 ± 4.71	33.652	<0.001*

t: Paired t-test p: p-value for comparing between Pre and Post
*: Statistically significant at p ≤ 0.05 SD: Standard deviation

Table (5): Mean scores of diabetic elderly patients' foot care outcome expectation pre- and post-program implementation (n = 71)

Items	Pre	Post	Paired t-test	
	Mean ±SD		T	P
Foot care outcome expectation score	53.93 ± 12.95	94.84 ± 6.85	26.146*	<0.001*

t: Paired t-test
p: p-value for comparing between Pre and Post
*: Statistically significant at p ≤ 0.05
SD: Standard deviation

Table (6): Correlations between elderly patients' knowledge, self-care behavior, and outcome expectation pre and post-program implementation (n = 71)

r - P values / variables		Pre	Post
Knowledge of foot care vs. Foot self-care behavior (FSCB)	R	0.488*	0.338*
	P	<0.001*	0.004*
Knowledge of foot care vs. Foot care outcome expectation (FCOE)	R	0.408*	0.483*
	P	<0.001*	<0.001*
Foot self-care behavior (FSCB) vs. Foot care outcome expectation (FCOE)	R	0.522*	0.276*
	P	<0.001*	0.020*

r: Pearson coefficient
*: Statistically significant at p ≤ 0.05

Table (7): Relation between level of knowledge about foot care and socio-demographic characteristics of elderly patients pre & post-program implementation (n = 71)

Elderly patients' characteristics	Level of Knowledge on foot care							
	Pre				Post			
	Unsatisfactory (n = 10)		Satisfactory (n = 61)		Unsatisfactory (n = 2)		Satisfactory (n = 69)	
	No.	%	No.	%	No.	%	No.	%
Education level								
Illiterate	2	20.0	16	26.2	0	0.0	18	26.1
Read and write	0	0.0	12	19.7	0	0.0	12	17.4
Primary Education	1	10.0	5	8.2	1	50.0	5	7.2
Preparatory education	1	10.0	5	8.2	1	50.0	5	7.2
Secondary Education	5	50.0	17	27.9	0	0.0	22	31.9
University	1	10.0	6	9.8	0	0.0	7	10.1
χ2(MCp)	**3.877 (0.550)**				**7.537* (0.031*)**			
Age								
61:65	3	30.0	31	50.8	0	0.0	34	49.3
66:70	5	50.0	12	19.7	1	50.0	16	23.2
>70	2	20.0	18	29.5	1	50.0	19	27.5
χ2(MCp)	**5.194 (0.287)**				**4.393 (0.465)**			
Gender								
Male	6	60.0	36	59.0	2	100.0	40	58.0
Female	4	40.0	25	41.0	0	0.0	29	42.0
χ2(FEp)	**0.003 (1.000)**				**1.421 (0.510)**			
Marital status								
Married	6	60.0	41	67.2	1	50.0	46	66.7
Widowed	3	30.0	19	31.1	1	50.0	21	30.4
Divorced	1	10.0	1	1.6	0	0.0	2	2.9
χ2(MCp)	**2.449 (0.377)**				**1.902 (0.561)**			
Residence								
Rural	1	10.0	11	18.0	0	0.0	12	17.4
Urban	9	90.0	50	82.0	2	100.0	57	82.6
χ2(FEp)	**0.395 (1.000)**				**0.419 (1.000)**			
Occupational								
Work	2	20.0	8	13.1	0	0.0	10	14.5
Don`t work	8	80.0	53	86.9	2	100.0	59	85.5
$\chi^{2(FE}$p)	**0.337 (0.624)**				**0.337 (1.000)**			
Monthly income								
Enough	4	40.0	14	23.0	1	50.0	17	24.6
Not enough	6	60.0	47	77.0	1	50.0	52	75.4
$\chi^{2(FE}$p)	**1.320 (0.261)**				**0.661 (0.445)**			

χ^2: **Chi-square test** MC: **Monte Carlo** FE**: Fisher Exact**
p: p-value for Relation between Relation knowledge on foot care and Socio-demographic characteristics
*: Statistically significant at $p \leq 0.05$

DISCUSSION

Diabetic foot problems are one of the most common chronic complications. Elderly diabetic patients' education on appropriate foot self-care has the potential to play a key role in preventing complications. Understanding the factors that contribute to sub-optimal behavioral outcomes in foot care is important. So, educating diabetic patients increases their knowledge of diabetic foot care and helps bridge the gap between knowledge and integration into daily activities.

Diabetic foot ulcer is one of the chronic complications of DM in which patients end up with disability and death if it is not effectively prevented and controlled. In this study, out of 71 diabetic elderly patients, about 47.9 % of the respondents' age was between (61-65) years, 59.2 % of them were male, 66.2% of them were married, most of them (85.9%) did not work in any occupations and 74.6% of elderly patients had an insufficient income.

Regarding the medical history of patients studied, the present study showed that the highest percentage had a duration of disease of 1-5 years, while nearly three-quarters of them were treated with oral medication. Also, more than three-quarters of the study didn't have a history of smoking.

These findings consisted with Hajipour et al., (2022), who conducted a study on the "Effect of stage-matched educational intervention on behavior change and glycemic control and reported that the average" in Iran and the duration of the disease was (7.18±4.21) years. Furthermore, another study carried out by Moussa & Gida, (2021), who conducted an Egyptian study about the " Effect of Foot Self-care Program among Diabetic Elderly Adults in Geriatrics Home." and found that the highest percentage of geriatric patients were treated by oral medications.

Concerning the diabetic elderly patients' total knowledge about foot care pre and post-program implementation. The present study result showed that the majority of the studied diabetic elderly patients had satisfactory knowledge of pre-program implementation which improved to the vast majority of them post-program implementation with a statistically significant difference at ($p<0.001$).

These findings are confirmed by El-Sayed et al., (2019), who conducted a study on the "Effect of an educational program on knowledge, practice, and self-efficacy of patients with type 2 diabetes" in Egypt and discovered a statistically significant increase in overall mean knowledge scores from pre/post and pre/follow up test at (P value < 0.000).

From the researcher's point of view, this result might be relevant to the positive effect of the educational program on diabetic patients' knowledge and increased their awareness about diabetes foot self-care.

The current study results pointed out that the mean score of diabetic elderly patients who reported practicing diabetic foot self-care activities was very low in the pre-implementation phase, with marked improvement in the mean score for most of them in the post-implementation phase with highly statistically significant differences at ($p<0.001$).

This finding is supported by the result of a study named "Knowledge, attitude, and practice regarding diabetic foot care among Saudi and non-Saudi diabetic patients in Alkharj " conducted in Saudi Arabia by Shamim, Alhakbani, Alqahtani, Alharthi & Alhaqbani (2022), and reported that the mean score of foot self-care practice was poor before they received educational program and increased after educational program implementation.

On the other hand, these results were in agreement with a study conducted in Indonesia by Sulistyo, (2020) named "Diabetic Foot Care Knowledge and Behaviors of Individuals with diabetes mellitus in Indonesia" whose results stated that the mean score of patients practiced diabetes foot self-care was satisfactory before the instructional program.

From the researcher's point of view, the obvious improvement of the present study could be attributed to the effect of the implemented educational program, which is custom-tailored to study patients' needs and covers all information required for a better understanding of disease and acceptance in everyday life.

It was demonstrated from the current study results that the mean score of diabetic elderly patients' foot care expectation was lower pre-program implementation which increased to be higher post-program implementation, with very highly statistically significant differences at ($p<0.001$).

This result was in line with Ewais, Ahamed & Farahat, (2021), who conducted a study about “Diabetic Foot-related Knowledge, Health Beliefs, and Practices among Diabetic Elderly" in Egypt and found that the mean score of patients' foot care outcome expectation was lower before the educational program which increased to high mean score after the educational program.

From the researcher's point of view, this improvement might be attributable to patients' motivation to exhibit these practices because of ongoing emphasis on the crucial importance of patients' practices in preventing or minimizing diabetic foot injuries throughout the implementation of educational recommendations.

The aforementioned findings are in agreement with Abid et al. (2022), who “Examined how educational intervention affected the knowledge and self-care behavior of diabetic retinopathy patients" who conducted a study in Egypt and reported that there was a statistically significant correlation between the patients' total knowledge and their self-care behaviors.

The current study results are supported and go in line with another study by Saber & Daoud, (2022), who conducted a study named " Knowledge and Practice about the foot-care and the Prevalence of Neuropathy among a sample of type 2 diabetic patients " in Iraq who revealed that the significant association between them, in which the foot care outcome expectation score was higher among patients with higher knowledge score. These results may reflect that total patients' knowledge acts as an important, independent, and interrelated factor in building up total foot care outcome expectations or confidence.

From the researcher's point of view, the finding of the current study might be due to knowledge that can play an essential role in shaping individuals' foot self-care and proper health maintenance practices and confidence level change is logical as the patients who gained more knowledge change are more likely to improve their outcome expectation regarding foot care.

Finally, the current study findings illustrated that there was a positive statistically significant relationship between the educational level of the studied elderly patients and their overall knowledge about foot care post-program implementation with a statistically significant difference at (p 0.031).

These results are congruent with Abd El Rahman & Abo Shousha,(2015) who have also added that educational programs have positive effects in improving the elderly' knowledge and self-care practice of diabetic foot.

From the researcher's point of view, the finding of the current study might be due to higher education levels having positive effects on foot self-care as the link between knowledge score change and practice change is logical as the patients who gained more knowledge change are more likely to improve their practice regarding foot health.

CONCLUSION

Based on the current study results, it was concluded that after applying a health education program on foot self-care behavior for elderly patients who have type 2 diabetes was effective in improving in level of patients' knowledge and their abilities to perform foot self-care practices and enabling factors regarding foot care of type 2 diabetic patients who received the educational program. Also, it was concluded that health education program have a positive significant impact on foot self-care behavior among elderly patients who have type 2 diabetes type two diabetic elderly.

RECOMMENDATION

Based on the results of the current study, the following recommendations are suggested:

1. Conduct periodic prevention guideline program and reduction sessions regarding the prevention of foot ulcers in diabetic elderly patients.
2. Develop awareness programs for all diabetic patients to enhance their knowledge, practices, and behaviors regarding foot care with an emphasis booklet to outpatient clinics to be available to all diabetic patients.
3. Regular continuing self-care programs should be designed to enhance the elderly skills ability to care for their foot with an emphasis on the most important risk factors and appropriate management.

Further research in diabetic foot as well as diabetes prevention and care should be encouraged.

- Carry out an implementation of different health education models regarding foot care among type 2 diabetic patients and evaluate its effect on their knowledge and practices.

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برنامج التثقيف الصحى حول سلوك الرعاية الذاتية بين كبار السن المصابين بداء السكرى من النوع الثانى فى مراكز الرعاية الصحية الاولية

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الخلاصة

تعد العناية الذاتية بالقدم جزءا من الوقاية المبكرة والكشف عن القدم السكري بين كبار السن والتي أصبحت تحديًا مستمرًا في الزيادة . تهدف هذه الدراسة تأثير برنامج التثقيف الصحي على سلوك العناية الذاتية بالقدم لدى كبار السن المصابين بداء السكري من النوع الثاني في مراكز الرعاية الصحية الأولية. تم استخدام تصميم دراسة شبه تجريبية مع اختبارات قبلية وبعدية. حيث تم إختيار خمسة مراكز رعاية صحية في محافظة بورسعيد، تم اختيار المراكزعشوائيا بحيث توفر الرعاية الصحية والمتابعة لمرضى السكري المسنين. تتكون العينة المقصودة من 71 مريضًا مسنًا مصابًا بداء السكري من النوع الثانى . تم استخدام ثلاث أدوات لجمع البيانات، كالتالى: استبيان حول معرفة مرضى السكري المسنين عن العناية بالقدم، ومقياس سلوك العناية الذاتية بالقدم السكري (DFSCBS) لتحديد سلوكيات العناية الذاتية بالقدم لدى مرضى السكري. وتوقعات نتائج العناية بالقدم (FCOE) لقياس مستوى ثقة كبار السن. وقد أوضحت النتائج فى هذه الدراسة إلى أن 97.2%من مرضى السكري المسنين الذين تمت دراستهم حصلوا على درجات معرفة مرضية بعد تنفيذ البرنامج، في حين تحسن متوسط درجات ممارستهم للعناية الذاتية بالقدم إلى 4.71 ± 94.80 بعد تنفيذ البرنامج، كما ارتفع متوسط درجات توقعات نتائج العناية بالقدم لدى مرضى السكري المسنين إلى 6.85 ± 94.84 بعد تنفيذ البرنامج، مع وجود فرق كبير إحصائيًا (*$p<0.001$). تشير النتائج إن برنامج التثقيف الصحي له تأثير إيجابي كبير على سلوك العناية الذاتية بالقدم لدى كبار السن المصابين بداء السكري من النوع الثاني. أوصت هذه الدراسة إجراء برنامج إرشادي وقائي دوري مستمر وجلسات للتقليل فيما يتعلق بالوقاية من قرحة القدم لدى كبار السن المصابين بداء السكري.

الكلمات المرشدة **:**الرعاية الذاتية,سكرى النوع الثانى ,الصحة , برنامج, كبار السن , القدم