

## Effect of Nursing Intervention Based on Self-Efficacy Theory on Promotion of Foot Self-Care and Its Acceptability among Diabetic Elderly people

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**Abstract: Background:** Diabetes has a huge economic and social impact on the individuals, families and health system as a whole. Diabetic foot is one of the most common complications among diabetic patients. Improper foot care can lead to many complications such as infection, ulcers, gangrene and amputation. **Aim of the study was** to evaluate the effect of nursing intervention based on self-efficacy theory on promotion of foot self-care and its acceptability among diabetic elderly people.

**Subjects and method: Study design:** A quasi experimental research design was used.

**Setting:** This study was carried out at 9 geriatric homes on 160 elderly selected by convenience sample. Those elderly divided equally to study and control group.

**Tools:** 1) Structured Interview Schedule, 2) Generalized Self-Efficacy Scale (GSE), 3) Knowledge of foot care (KOFK), 4) Diabetic foot self-care behavior scale (DFSBS), 5) Foot care outcome expectation (FCOE) and 6) The acceptability profile.

**Results:** The total knowledge, foot care outcome expectation, foot care self-efficacy and foot self-care behavior score significantly improved immediately and three months post-program than the pre-program for the study group. Also, there was a significant positive correlation between the total knowledge, expectation, care self-efficacy and behavior scores pre and three months post nursing intervention for both groups. There was a good acceptance of the program by the elderly people. **Conclusion:** The nursing intervention based on self-efficacy theory was effective to promote foot self-care among diabetic elderly persons at geriatric homes.

**Recommendations:** Community, geriatric, and medical surgical nurses need to design preventive health programs based on self-efficacy for the elderly to reinforce and motivate beliefs about ability to self-care for diabetic clients. It is necessary to measure the participant's acceptance of the program to identify and remove obstacles.

**Key words:** self-efficacy theory, self-care, diabetes, acceptability, elderly people.

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### I. Introduction

Diabetes has been one of the world's most severe health challenges in a decade, with the epidemic becoming depleted from both human and material resources threatening advanced and developing nations as complications such as cardiovascular disease, diabetic neuropathy, renal failure and amputation have resulted [1]. All complications result in variable degrees of disability, decreased survival, decreased living standards and enhanced economic burdens on the individual and family culture as a whole [2].

The International Diabetes Federation [3] and the World Health Organization [4] estimated the worldwide incidence of diabetes at more than 422 million people and predicted an increase to 642 million by 2040 and would be the seventh leading cause of death in 2030. In addition, the CAPMAS [5] shows that the number of type 2 diabetics in Egypt reached 39 million. About 8.6 million of these 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. In a report by the National Diabetes Committee in Egypt as part of the 100 million health campaign for 2019 noted that the proportion of diabetes in the elderly was about 35.7%. The International Diabetes Federation [3] revealed that Egypt spends \$ 1 billion a year on treating diabetes.

Diabetics have a double risk for peripheral artery disease compared to others [6]. It ranges from 6.5% to

29.3% [7]. This may cause ischemic foot ulcers, delayed wound healing and lower limb amputations by one quarter of them (25.0%) [8]. Previous studies have shown that 20.0% of diabetics never check their feet on the week [9, 10], and about 15.0% of them reported never drying after washing their feet [10]. Patients with a high risk for foot ulcers such as diabetic and peripheral neuropathy should be performed aggressive self-care foot systems, including daily foot tests. Self-care can prevent foot ulcers and subsequent amputations among patients who had diabetes [11].

Self-efficacy refers to an individual's belief in the ability to perform the behaviors necessary to produce specific performance outcomes [12,13]. It has many effects on choices regarding behavior, level of motivation, work performance, thinking patterns, responses, healthy behaviors and relationship to loss of control. It can be increased by providing clear instruction, skills or training, and demonstrating desired behavior [14]. The theoretical background of the program was based on Pandora's self-efficacy theory with a focus on actions to enhance self-efficacy. Pandora identified four factors that affect self-efficacy. These include empowerment experiences, seeing people who are similar to the requirements of a single self-management task successfully, social persuasion that an individual has the ability to succeed in certain activities, inferences from physical and emotional states that demonstrate personal strengths and weaknesses. It has included components to enhance the level of self-efficacy such as achievement accomplished, alternative experience, physical and emotional states, and verbal cognition [15]. Self-efficacy promotion activities have been applied with knowledge transfer during the intervention program.

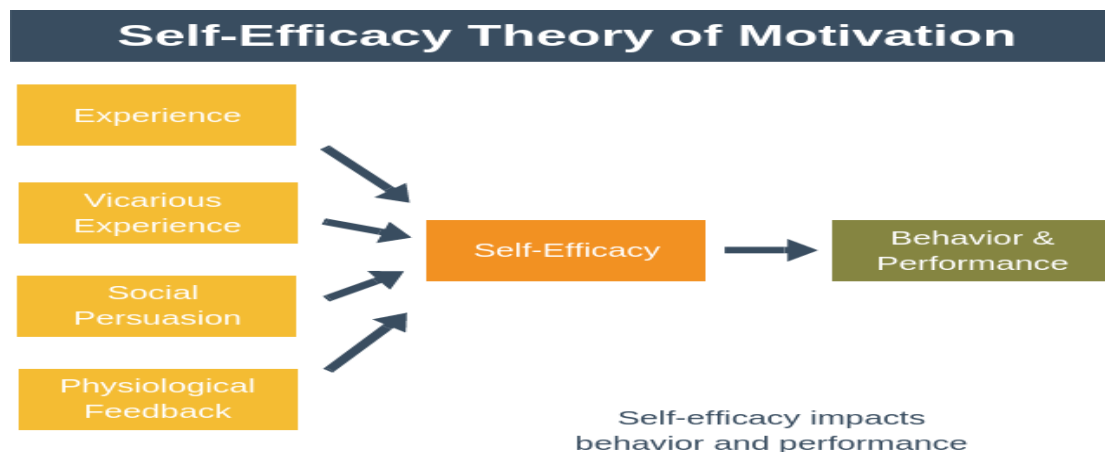
Diabetes education is effective in improving self-care behavior of the foot and preventing diabetic foot problems [16]. Self-care behavior is the ability, knowledge, skills and confidence to make daily decisions [17]. Self-care behavior of the feet is necessary because this enables improved health outcomes [18]. However, awareness of self-care behavior in Egypt with diabetes is relatively low; about 38.6% of diabetics attended diabetic clinics, 22.8% had diabetic foot, 23.2% of them used a moisturizer on their feet, and 26.5% wore proper shoes [5].

In Egypt, the public and private geriatric homes have spread due to the aging population and changing the culture. Geriatric home (G.H.) is a social institution designed and equipped for the elderly to deliver them a comfortable lifestyle and provides appropriate health, psychological, cultural, social and recreational care programs. There are 174 G.H. serving 3,414 elders [5]. The first Egyptian private G.H. was founded in Gharbia in 1900 and the government established the first G.H. in Cairo in 1961 [19].

The nurse promotes and maintains the physical and social health of the diabetic elderly patients [20]. Diabetic elderly need in their stage of life to maintain self-esteem, self-confidence and purpose in life and a satisfactory sense of personal identity and social role [21]. Generally, older people have positive self-concepts, the ability to see themselves as unique beings, and the ability to communicate effectively, and need to feel belonging, relative independence and freedom, and to recognize themselves as loving and valuable human beings [22].

#### **Significance of the study:**

Egypt faces many challenges in increasing the number of elderly people, fewer geriatric homes, increasing diseases, lack of culture and low income [5]. Diabetic elderly people at geriatric homes challenged the self-care of diabetic feet associated with several factors; lack of motivation, decrease health support, isolation and lack of resources [23]. Therefore, the nurse plays an important role in the prevention and control of diabetes among the elderly by further strengthening and stimulating their knowledge about these complications to modify their self-efficacy and encourage their practice [24,25]. So, the medical surgical, community and geriatric nurses can work together to design a nursing intervention based on self-efficacy theory to promote foot self-care among diabetic elderly people. This can stimulate their knowledge about these complications to modify their self-efficacy and encourage their practice.



Source: <https://expertprogrammanagement.com/2018/10/self-efficacy-theory-of-motivation/>

### Aim of the study:

The study aimed to evaluate the effect of nursing intervention based on self-efficacy theory on promotion of foot self-care and its acceptability among diabetic elderly people.

### Research Hypothesis:

It is expected that motivation and improvement will be instilled in the elderly, will increase the knowledge, preventive beliefs and practices related to self-care of the feet after implementation of the self-efficacy program among the diabetic elderly people.

## II. Materials and Method

### Study design:

A quasi experimental research design was used.

### Study setting:

This study was conducted at Al-Gharbiya governorate, Egypt. It contains nine geriatric homes. It serves the surrounding rural villages. There are five geriatric homes in Tanta (Karma, Resala, Febi, Aldeiafa and Saada Home), two in Al-Mehala (Almosenat and Almahaba Home), one in Kafr Alziat (Ahbaab Allah Home) and one in Zefta (Almosenat Home).

**Subjects:** A convenient sample of 160 diabetic elderly persons at the nine geriatric homes. Subjects were divided into two groups equally (study and control group) each group included 80 elder people. The attrition rate in this study was 0.0% at week-4 to week-12. The final number at week-12 included 160 respondents added to 20 elderly in pilot study [26].

### Subjects characteristics:

- (1) Normal protective sensation,
- (2) Normal lower extremities circulation,
- (3) Absence of foot deformity or ulceration,
- (4) No previous foot ulcer or amputation were classified as low risk and were recruited for the study.
- (5) Able to communicate. In accordance with the ethics of scientific research, and
- (6) Independence.

### Patients excluded:

Patients who had any abnormal findings were excluded. Then they were provided with a foot care brochure as a reference and referred to medical doctors for further consultation and treatment.

**The sample size was determined** using Epi info program assuming that the prevalence of good knowledge about foot care is 50% with 95% confidence interval and 80% the power of the study [27].

**Tools for data collection:** six tools were used to collect the necessary data as follows:-

**Tool 1. Older diabetic Structured Interview Schedule:** It was developed by the researchers in Arabic language after reviewing of the related literature [28]. It encompassed the following parts:-

Part I: - Socio-demographic characteristics of the elderly (age, gender, educational level, marital status,

having family support, and duration of stay in the geriatric home) [26].

Part II: - Health history of the elderly including medical and clinical characteristics (duration of diabetes, treatment of diabetes, other disease except diabetes, smoking status, previous diabetes education received and hospitalization due to diabetes problem) were collected as baseline data.

**Tool II. General/Generalized Self-Efficacy Scale (GSE):**

The General Self-Efficacy Scale is the most popular self-efficacy scale. It has been in use since 1995 and has been cited in hundreds of articles. It was developed by Schwarzer and Jerusalem, (1995) [29] two leading experts in self-efficacy. The scale consists of ten items rated on a scale from 1 (Not true at all) to 4 (Exactly true). These items are as follows:

- I can always manage to solve difficult problems if I try hard enough.
- If someone opposes me, I can find the means and ways to get what I want.
- It is easy for me to stick to my aims and accomplish my goals.
- I am confident that I could deal efficiently with unexpected events.
- Thanks to my resourcefulness, I know how to handle unforeseen situations.
- I can solve most problems if I invest the necessary effort.
- I can remain calm when facing difficulties because I can rely on my coping abilities.
- When I am confronted with a problem, I can usually find several solutions.
- If I am in trouble, I can usually think of a solution.
- I can usually handle whatever comes my way.

The score is calculated by adding up the response to each item. The total will be between 10 and 40, with higher scores indicating higher self-efficacy.

Generalized Self-Efficacy Scale (GSES)	Scores
High	30-40
Moderate	20-29
Low	10-19

**Tool III. Knowledge of foot care (KOFC):** It was developed by Eigenmann et al., (2011) [30]. The questions asked were related to diabetic foot complications, risk factors, and foot care behavior. The scale consisted of 11 items with three possible answers (true, false, don't know). Each correct answer was given 1 point. A higher score indicated a good level of knowledge about foot care. The total score ranged from 0–11.

Knowledge of foot care (KOFC)	Scores
Good	8-11 => 70%
Satisfactory	6-7 = 50-60%
Poor	< 6 = <50%

**Tool IV. Diabetic foot self-care behavior scale (DFSBS):** It was developed by McInnes and colleges, (2011) [21]. It contained seven items: checking the bottom of the feet and between toes, washing between toes, drying between toes after washing, applying lotion, inspecting the insides of shoes, and breaking in new shoes. The DFSBS includes the important aspect of daily foot care routines. The score for each behavior was calculated as follow: done correctly was scored "one", done incorrectly or not done was scored "zero". Scores for all practices were summed up. The total practice score was seven [2]. It was converted into a percent score and classified into:

Diabetes foot self-care behavior scale (DFSBS):	Scores
Satisfactory practice	>60% (> 4) of the total practice score.
Unsatisfactory practice:	≤ 60% (≤ 4) of the total practice score.

**Tool V. Foot care outcome expectation (FCOE):** It was developed by Chin et al., (2013) [28]. This scale measured the participant's confidence that the desirable results can be achieved if they perform proper foot self-care behavior. It had six items and the scale consisted of five scores; strongly disagree (1), to strongly agree (5). The score ranged from 6–30; a higher score indicated that the participant has a high self-confidence that the foot self-care behavior he/she performed will produce a good effect.

Foot care outcome expectation (FCOE)	Scores
High self-confidence	23-30
Moderate self-confidence	15- 22
Low self-confidence	6-14

**Tool VI. The acceptability profile:** It was developed by O'Brien et al., (2015) [31]. It was evaluated after completing the 12-week program with a modified version of the Abbreviated Acceptability Rating Profile. Eight items were used to assess respondents' acceptability of the self-efficacy education program. A 5-point Likert Scale (1=strongly disagree - 5= strongly agree) was used. The score ranged from 8 to 40 and a higher score indicated better acceptability towards the program delivered.

**Validity and reliability of the tools:** the questionnaire content validity was determined by a panel of five experts in the field of community, medical surgical and geriatric nursing to test the content validity. Changes were carried out according to their judgment on the clarity of the sentences and relevance of the content. The reliability of tool II, tool III, tool IV and tool V were tested on 20 older adults with diabetes in order to measure the internal consistency of these tools by using Cornbrash's alpha test.  $r = 0.84$  for tool II,  $r = 0.88$  for tool III, and  $0.87$  for tool IV and V.

**Pilot study:** A pilot study was carried out on 20 older adults with diabetes; they were not included in the study participants. It was done in order to test the clarity and applicability of the tools, test wording of the questions and estimate the time needed for the interview. Also, to detect any obstacles or problems that might arise in data collection.

**Method:**

- Official permission to conduct the study was obtained from the Dean of the Faculty of Nursing to the directors of geriatric homes to conduct the study. Directors of the selected geriatric homes were informed about the purpose of the study to maintain their cooperation.
- Tool I was developed by the researchers based on thorough systematic review of relevant literature then; tool II, tool III, IV and tool V were translated by the researchers into Arabic language. The Arabic version of all these tools was tested for content validity by five experts in the related field. The necessary modifications were done according to the experts' valuable comments.

**- Development of foot self-care management and model**

The proposed foot self-care model was developed by the researchers based on reviewing the most recent related literature. The program comprises self-efficacy enhancing activities were applied together with knowledge and behavior transfer during the intervention program needed for foot care control among older adults with diabetes. Self-care knowledge included information about the definition of the diabetic foot, its symptoms, causes, and risk factors, food and medications. The program is aimed to integrate medical knowledge with psychological care and stimulate the elderly in words and actions and some possibilities that help in the performance of foot care to stimulate his personal motivation and motivation to self-care of the foot.

**- Primary assessment outcome and fieldwork**

Older adults with diabetes who achieved the inclusion criteria were interviewed individually by the researchers in the outpatient clinic of the geriatric home using tools from I to V in order to obtain the baseline data (Pre-test phase). The interview took around 20-30 minutes, this allowing to the interviewers' level of accepting and comfort. This phase is enclosed a period of one months, from the beginning of January 2018 till the end of January 2018.

- A foot care package consisting of a booklet on foot self-care, a nail clipper, olive oil, sponge finger toe separator and a small towel was provided to each respondent after the seminar. A reminder checklist has been developed for the local nurse in charge of the institution's clinic. The nurse also received instructions from the researchers to remind participants and provide support and guidance on the performance of daily self-care behavior of the feet. Respondents were advised to seek guidance from the local nurse or their colleagues. The nurse was required to place her signature on the questionnaire's name column in the reminder checklist after visiting the respondents.



- The telephone numbers of all members were reserved in order to arrange for program's sessions.

**- Program conduction phase:**

Before the conduction of the program session, the researchers organize the environment to be quiet and comfortable for each participant in the groups, well ventilated and have suitable lighting. The researchers were distributing the planned manual pamphlet on each contributor in order to clarify the desired knowledge and

skills. This brochure contains the descriptive colored pictures and the main topics of each session of foot self-care management model.

The projected program showed on group bases of 8 groups in total. Each group involved 10 older adults with diabetes, 20-30 minutes for the session, fourth/month, and two groups per day. The sessions were carried out in the outpatient clinic and geriatric home with the permission of the responsible supervisor nurse. The total number of sessions was 40 sessions, 5 sessions per each group. This phase covered a period of 3 months from the beginning of March 2018 till the end of May 2018.

**Implementation program:**

Session, title	Details of session	Material/ instrument
Session 1 ( study and control group) Pre-test evaluation Taking into consideration the use of simple language according to the educational level	<ul style="list-style-type: none"> <li>- Welcoming and introduction</li> <li>- First time (pre-test): before implementation of the preventive program (using tools I -V) for both study and control group.</li> <li>- Goal setting</li> <li>- What is their knowledge about diabetic foot?</li> <li>- What is their behavior about foot care?</li> <li>- What is their expectation about feet care outcome?</li> <li>- What is their general self-care efficacy?</li> </ul>	Manual file, laptop, screen projector, PPT and foot kit
Session 2 ( study group only) Knowledge of foot care The discussion, motivation and reinforcement were used during the program	<ul style="list-style-type: none"> <li>- Welcoming</li> <li>- The participants are physically and emotionally stable to involve in the program</li> <li>- Build up rapport and thrust-worthiness, give guidance and encouragement</li> <li>- Advice to read and refer to the pamphlet (symbolic modeling)</li> <li>- Leave responsibility and encourage an active role (independence) of the participants</li> <li>- Goal setting</li> <li>- What is the diabetic foot mean?</li> <li>- What are diabetic foot symptoms?</li> <li>- What are the causes and risk factors for diabetic foot in older adults?</li> <li>- What are the warning signs and diagnostic measures?</li> <li>- What is self-care efficacy?</li> </ul>	Verbal persuasion and written experience in the session to enhance learning Group discussion
Session 3: ( study group only) Diabetic foot- care behavior A standardized model for steps of foot self-care behavior	<ul style="list-style-type: none"> <li>- Welcoming</li> <li>- Checking the bottom of the feet and between toes, washing between toes, drying between toes after washing, applying lotion, inspecting the insides of shoes, and breaking in new shoes.</li> <li>- Remind the participants about foot self-care behavior</li> <li>- Give positive feedback and encouragement</li> <li>- Advice to read and refer to the pamphlet (symbolic modeling)</li> </ul>	A pamphlet on foot care, pictures, nail-clipper, Sponge Finger Toe Separator moisturizing lotion, small towel for each elder. Group discussion, role-playing, demonstration and re-demonstration, models
Session 4: Self-efficacy, Self-monitoring diabetic foot control	<ul style="list-style-type: none"> <li>- Welcoming</li> <li>- Summary about the previous session</li> <li>- Self-evaluation: get a feedback on goals and determine the obstacles</li> <li>- Advise the participants to keep continue with the positive foot self-care behavior</li> </ul>	verbal persuasion and written experience in the session to enhance learning
Session 5 1- Physical and emotional States:  2-Performance achievement: 3- Indirect experience: 4- Alternative experience 5- Verbal persuasion: 6- Evaluation 7- Manual file 8- End the program	<ul style="list-style-type: none"> <li>- Welcoming</li> <li>- Pay attention to participants who have difficulty cases (pain, illness, stress)</li> <li>- Continue the desired practice for the behavior is successful</li> <li>- Sharing experiences with each other (social modeling)</li> <li>- Advice to read and reference the booklet (symbolic Modeling)</li> <li>- Give encouragement, advice and specific guidance</li> <li>- Leave responsibility and encourage an active role (independent) of the participants</li> <li>- Advise the participants to keep continue with the positive foot self-care behavior</li> <li>- Individual discussion (repeat activities as conducted in week 4, if necessary).</li> <li>- Foot kit and bookmark reminder 20 accurate researchers' advices for the participants to continue to pursue positive self-care for the feet.</li> <li>- I thank all the participants and give the mobile numbers of the</li> </ul>	<ul style="list-style-type: none"> <li>- Manual file, screen projector, PPT and foot kit</li> <li>- Verbal persuasion and written experience in the session to enhance learning</li> <li>- Group discussion, role-playing, demonstration and re-demonstration models</li> </ul>

	researchers to communicate and give advice if necessary - Determine date for meeting to obtain feedback from the participants and evaluate the effectiveness of the proposed program after 12 weeks from first session.	
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- After three months of the program, the researchers presented leaflets and booklets to the control group for benefits.

**Evaluation/follow up phase:**

1. The first time (Pre-test): Before implementing the intervention program (using the first and second tools) for each of the study groups and control.
2. The second time (Immediate post-test): Immediately after the implementation of the intervention program using the first tool and the second tool for the study group only.
3. The third time (follow-up): Three months after the implementation of the preventive program using the first tool and the second tool for each of the study and control groups.

The total duration of the study (stages of assessment, planning, implementation and evaluation) was about 10 months from the beginning of January 2018 till the end of October 2018.

**Ethical considerations:**

- The approval of the Ethics Committee of the Faculty of Nursing.
- Free informed consent has been obtained from all elders.
- Informed consent was obtained from the study subjects.
- The nature of the study did not cause any damage and/or pain to the whole sample.
- Confidentiality and privacy with regard to data collected have been taken into account.
- Interview the corresponding papers were anonymous.

**Statistical analysis:**

The collected data were organized, tabulated and statistically analyzed using Statistical Package for Social Sciences (SPSS) version 23. For numerical data, the range, mean and standard deviation were calculated. For comparison between two means, independent t-test was used. Differences between more than two means were tested by (F) repeated measures analysis of variance. For categorical variables, the number and percentage were calculated and differences between subcategories were tested by Chi- square (X<sup>2</sup>). When Chi-square was not appropriate, Wilcoxon test and Monte Carle exact test were used. Correlation between variables was evaluated using Pearson's correlation coefficient. The level of significance was adopted at  $p < 0.05$ .

**III. Results**

Table 1 shows the distribution of the studied groups with regard to their social and demographic characteristics. It revealed that, the age of the study group participants ranged from 62 to 87 years with a mean age of 70.13 years old, 62.5% were males, 52.5 % were widow, 53.75% had either secondary education, 13.75% were either employees or workers, 78.75% reported that their monthly income was enough, 75.0 % have family support, more than one half of them (66.25%) were nonsmokers and 50.0% received health care by nurses.

Table 2 illustrates the distribution of the studied groups with regard to their duration of stay in the geriatric home, diabetes duration, hospitalization and type of treatment. The mean value for the duration of the participants stay in the geriatric home was four years. On average, the participants have been diagnosed with diabetes for six years, 93.75% reported no history of hospitalization related to diabetes three months prior to baseline assessment. More than half (55.0%) of them had oral medication.

Table 3 shows the distribution of studied groups in relation to their total knowledge score about foot care throughout the study period. It revealed that the majority of the study and control groups (92.9%, 80.3% respectively) had poor knowledge score before the implementation of the intervention, while the majority of the study group had good knowledge score immediately and three months after the intervention (91.7% and 82.3% respectively). Regarding the study group, there was a significant improvement in their knowledge score pre and three months after the intervention.

Moreover, the table illustrated that there was a significant increase in the total mean score of knowledge for the study group throughout the study period, as the mean score was  $7.29 \pm 9.31$  before the program and became  $44.48 \pm 5.93$  and  $38.95 \pm 6.73$  immediately and three months post program respectively. On the other hand, there was no significant difference in the total mean score of knowledge for the control group pre and three months post program ( $6.91 \pm 8.88$  and  $6.96 \pm 8.96$  respectively).

Table 4 demonstrates the distribution of the studied groups according to their total diabetes foot self-care behavior scale score throughout the study. It showed that before implementation of the intervention, 70.6% and 84.7% of the study group and control group respectively reported unsatisfactory total score of practice. The

total score became satisfactory for all the study group immediately and three months after the intervention. The difference was statistically significant ( $p= 0.001^{**}$ ).

In addition, the total mean of reported practice score for the study group increased from  $10.04\pm 2.45$  pre-program to  $16.44\pm 1.26$  immediately post and  $17.33\pm 0.864$  three month post the program, with a statistically significant difference between them ( $P=0.001^{**}$ ). Regarding the control group, there was no significant difference in the total mean reported practice score pre and three months post the program ( $p>0.05$ ).

Table 5 shows the distribution of the studied groups according to their total scores of generalized self-efficacy scale constructs throughout the study period. The table illustrated that the study group showed a statistically significant improvement in their total high scores of generalized self-efficacy ( $28.2\rightarrow 56.5\rightarrow 86.5$ ) throughout the study phases ( $p= 0.001^{**}$ ). No significant difference was observed for the control group ( $p>0.05$ ).

Table 6 explains the distribution of the studied groups in relation to their total foot care outcome expectation scores throughout the study period. It was clear that pre-program, 21.8 % and 29.4% of both the study and control group respectively had high self-confidence. Immediately and three months post the educational intervention, the majority of the study group (71.8 % and 75.3% respectively) showed a significant increase in their high self-confidence ( $p=0.001^{**}$ ). Contrarily, there was a non-significant difference in the total foot care outcome expectation score for the control group where only 28.2% of them had high self-confidence three months post the intervention ( $p=0.162$ ).

Table 7 shows the correlation between total score of knowledge, behavior, self-efficacy and outcome expectation about foot care for the studied groups pre and 3 months post the program. The table illustrated that there was a significant positive correlation between the total knowledge, behavior, self-efficacy and outcome expectation scores pre and three months post-program for both the study and control group ( $p<0.05$ ). This means that increased practice score was associated with increased knowledge score and high self-confidence.

Table 8 clarifies the correlation between total score of knowledge of foot care, general self-efficacy, and diabetic foot care behavior for the study group and their socio-demographic characteristics pre-intervention and three months post-program. The table revealed that there was a significant positive correlation between educational level, occupation, duration of stay in the geriatric home and total knowledge score among the study group pre and three months post-program ( $p<0.05$ ). This means that knowledge score increased for men than women, and educated elderly who stayed a long time in geriatric homes. Meanwhile, general self-efficacy had a significant positive correlation with the educational level and diabetes duration. DFSBS of the study group was influenced by duration of stay in the geriatric home and diabetic duration after the program only.

Table (9) shows the acceptability profile to the program delivered. The table revealed that, the acceptability score was moderately high (mean= $64.84\pm 4.08$ ). Majority of the respondents reported that the program was acceptable (mean= $5.32\pm 0.48$ ), effective (mean= $5.06\pm 0.81$ ) and can be applied to other older patients with diabetes (mean= $5.29\pm 0.46$ ). The respondents liked this program, considered the program a good way to prevent diabetic foot problems (mean= $5.32\pm 0.48$ ), found it helpful and had no adverse effects.

**Table 1:** Distribution of the studied groups in relation to their socio-demographic characteristics.

Variables	The studied elderly people (N=160)		Total
	Study group (N=80)	Control group(N=80)	
	No. (%)	No.(%)	
<b>Age:</b> Mean $\pm$ SD	70.13 $\pm$ 7.73	69.39 $\pm$ 7.38	
Range	62 – 87	61-86	69.76 $\pm$ 7.5
<b>Gender:</b>			
Male	50 (62.5)	42 (52.5)	92(57.5)
Female	30 (37.5)	38 (47.5)	68(42.5)
<b>Marital status:</b>			
Married	16 (20.0)	22 (27.5)	38(23.75)
Single	22 (27.5)	10 (12.5)	32(20.0)
Widow	42 (52.5)	48 (60.0)	90(56.25)
<b>Educational level:</b>			
Illiterate	5 (6.25)	8 (10.0)	13(8.12)
Elementary	11 (13.75)	13 (16.3)	24(15.0)
Secondary	43 (53.75)	30 (37.5)	73(45.63)
University or more	21 (26.25)	29 (36.2)	50(31.25)
<b>Occupation:</b>			
Not work	69 (86.25)	64 (80.0)	133(83.13)
Work	11 (13.75)	16 (20.0)	27(16.87)
<b>Monthly income:</b>			
Enough	63 (78.75)	53 ( 66.3)	116(72.50)
Not enough	13 (16.25)	22 (27.5)	35(21.87)
Enough and save	4 (5.0)	5 (6.2)	9(5.63)



<b>Family support:</b>			
Yes	60 (75.0)	57 (71.25)	117(73.13)
No	20 (25.0)	23 (28.75)	43(26.87)
<b>Smoking:</b>			
Yes	27 (33.75)	34 (42.5)	61(38.13)
No	53 (66.25)	46 (57.5)	99(61.87)
<b>Caregiver:</b>			
Family	32 (40.0)	34 (42.5)	66(41.25)
Nurse	40 (50.0)	36 (45.0)	76(47.50)
Others	8 (10.0)	10 (12.5)	18(11.25)

**Table 2:** Distribution of the studied groups in relation to their duration of stay in geriatric home, diabetes duration, hospitalization and type of treatment.

Variables	The studied elderly (N=160)		Total
	Study group (N=80)	Control group(N=80)	
<b>Duration of stay in geriatric home</b>			
Mean ± SD	4.088± 0.578	4.25± 0.819	4.16 ±0.69
<b>Diabetes duration</b>			
Mean ± SD	6.51±1.43	5.57±1.77	6.04 ± 1.6
<b>Hospitalization</b>			
Yes	5 (6.25)	4 (5.0)	9 (5.62)
No	75 (93.75)	76 (95.0)	151(94.38)
<b>Treatment</b>			
Oral drug	44(55.0)	57(71.3)	101(63.13)
Insulin	36(45.0)	23(28.7)	59 (36.87)

**Table 3:** Distribution of studied groups in relation to their total Knowledge score about foot care.

Knowledge score about foot care	The studied elderly people (N=160)						Z P
	Study group (N=80)			$\chi^2$ P	Control group (N=80)		
	Pre-intervention	Immediate Post-test	3 months Post-test		Pre-intervention	3 months Post-test	
	%	%	%	%	%		
Poor	92.9	1.2	3.6	162.8	80.3	94.1	1.155
Satisfactory	5.9	7.1	14.1	0.001**	3.5	4.7	0.248
Good	1.2	91.7	82.3		1.2	1.2	
<b>Range</b>	(1-40)	(20- 40)	(12-40)	<b>F</b>	(1- 40)	(1- 40)	<b>t-test</b>
<b>Mean ± SD</b>	7.29±9.31	44.48±5.93	38.95± 6.73	<b>P</b>	6.91±8.88	6.96±8.96	<b>P</b>
				683.9			1.216
				0.001**			0.227

The result is significant at p < .05\* and significant at p < .001\*\*.

**Table 4:** Distribution of the studied groups according to their total foot self-care behavior scale score throughout the study phases.

Diabetes foot self-care behavior scale (DFSBS) score	The studied elderly (N=160)						Z P
	Study group (n=80)			$\chi^2$ P	Control group (n=80)		
	Pre-intervention	Immediate Post-test	3 months Post-test		Pre-intervention	3 months Post-test	
	%	%	%	%	%		
Unsatisfactory practice	70.6	0.0	0.0	155.32	84.7	80.9	0.905
Satisfactory practice	29.4	100.0	100.0	0.001*	15.3	14.1	0.366
<b>Range</b>	(0- 11)	(8-11)	(6-11)	<b>F</b>	(3- 11)	(3-11)	<b>t P</b>
<b>Mean ± SD</b>	10.04±2.45	16.44±1.26	17.33±0.864	<b>P</b>	9.06±2.64	9.09±2.60	<b>P</b>
				410.87			0.904
				0.001*			0.369

**Table 5:** Distribution of the studied groups according to their total scores for generalized self-efficacy scale constructs throughout the study period.

Generalized Self-Efficacy Scale (GSE)	The studied elderly (N=160)						Z P
	Study group (n=80)			$\chi^2$ P	Control group (n=80)		
	Pre-intervention	Immediate post-test	3 months post-test		Pre-intervention	3 months post-test	
	%	%	%	%	%		
High	28.2	56.5	86.5	147.48	24.7	34.7	1.807
Moderate	31.8	23.5	3.5	0.001*	55.3	45.3	0.063
Low	40.0	20.0	10.0		20.0	10.0	

The result is significant at p < 0.05\* and significant at p < 0.001\*\*.

**Table 6:** Distribution of the studied groups in relation to their total foot care outcome expectation scores throughout the study period.

Total Foot care outcome expectation (FCOE) score	The studied elderly people (N=160)						
	Study group (n=80)			$\chi^2$ P	Control group (n=80)		Z P
	Pre-intervention	Immediate post-test	3 months post-test		Pre-intervention	3 months post-test	
	%	%	%		%	%	
- High self-confidence	21.8	71.8	75.3	157 0.001**	29.4	28.2	1.399 0.162
- Moderate self-confidence	40.0	8.2	4.7		20.6	31.8	
- Low self-confidence	48.2	20.0	20.0		50.0	40.0	

The result is significant at  $p < 0.05^*$  and significant at  $p < 0.001^{**}$ .

**Table 7:** Correlation between total score of knowledge, behavior, self-efficacy and outcome expectation about foot care for the studied groups pre and 3 months post-program.

Variables	Study group (n=80)				Control group (n=80)			
	Pre-intervention		3 months post-intervention		Pre-intervention		3 months post-intervention	
	knowledge score	behavior score	knowledge score	behavior score	knowledge score	behavior score	knowledge score	behavior score
	r P	r P	r P	r P	r P	r P	r P	r P
Total self-efficacy score	0.244 0.024*	-	0.275 0.011*	-	0.434 0.001*	-	0.44 0.001*	-
Total outcome score	0.36 0.001**	0.207 0.057*	0.371 0.001**	0.386 0.001**	0.402 0.001**	0.422 0.001**	0.391 0.001**	0.413 0.001**

The result is significant at  $p < .05^*$  and significant at  $p < .001^{**}$ .

**Table 8:** Correlation between total knowledge score for foot care, general self-efficacy, and diabetic foot care behavior for the study group and their socio-demographic characteristics.

Variables	Study group (N=80)					
	KOFC		GSE		DFSBS	
	Pre-intervention	3 months Post-intervention	Pre-intervention	3 months Post-intervention	Pre-intervention	3 months Post-intervention
	r P	r P	r P	r P	r P	r P
Sex	0.132 0.22	0.046 0.67	-0.053 0.62	-0.067 0.54	0.093 0.39	0.056 0.61
Educational level	0.253 0.01*	0.268 0.013*	0.346 0.001**	0.175 0.009*	0.088 0.42	-0.079 0.47
Occupation	0.425 0.001**	0.303 0.005*	0.069 0.52	0.0182 0.09	0.155 0.15	0.081 0.45
Diabetes duration	-0.130 0.23	0.083 0.45	0.084 0.04*	-0.017 0.03*	-0.087 0.43	0.041 0.16
Duration of stay in G.H.	0.242 0.02*	0.220 0.04*	0.052 0.63	0.035 0.74	0.089 0.41	0.031 0.008*

The result is significant at  $p < 0.05^*$  and significant at  $p < 0.001^{**}$ .

**Table 9:** The acceptability profile to the program delivered at 3 months post-intervention program (N=80).

Variables	Mean $\pm$ SD
This is an acceptable program for you.	5.32 $\pm$ 0.48
The program should be effective in changing the foot self-care behavior.	5.06 $\pm$ 0.81
This program can be used for other older patients with diabetes who did not perform foot self-care behavior properly.	5.29 $\pm$ 0.46
You will continue to perform the foot self-care behavior after this program.	4.87 $\pm$ 0.81
This program would not have bad side effects for you.	5.32 $\pm$ 0.48
You liked this program.	5.32 $\pm$ 0.48
The program was a good way to prevent diabetic foot problems.	5.32 $\pm$ 0.48
Overall, the program would help you.	5.32 $\pm$ 0.48
Total score	64.84 $\pm$ 4.08

#### **IV. Discussion**

Diabetes is a common disease among the elderly. People with diabetes tend to have a risk for development of foot ulcers, amputations and other clinical abnormalities in the lower limb if not treated appropriately. The older adults require adequate care and facilities for a better quality of life and healthy ageing. Besides that, lack of family members can be a major missing element in the support system [32]. Elderly in geriatric home have a moderate level of support and well-being [33]. The local healthcare staff is small number and focus on blood glucose monitoring and medication intake only. However, the efficacy and influence of a health education program on their foot self-care behavior is still largely unexplored in Egypt.

Self-efficacy has been increasingly applied as a model of health behavior and as a framework for developing health intervention programs in various populations [34]. In older diabetic patients, the applied interventions to increase the outcomes of foot care have been studied morally and self-care management programs may not be applicable in this age group. Thus, foot care in those patients needs extra considerations to disease process, diagnostic measures and treatment regimen [35]. In this regard, knowledge and skills about foot self-care management should be a priority for future intervention programs in order to promote specific behavioral strategies for foot ulcer prevention. Also, health education considered as an important part in the self-efficacy of foot care and strongly recommended for older adults with diabetes [36]. It assumed that improving motivation and reinforcement is a basic stone to improve the practice of people. Thus, the aim of this study was to evaluate the effect of nursing intervention based on self-efficacy theory on promotion of foot self-care and its acceptability among diabetic elderly people.

Based on socio-demographic background data, the results of this study showed that a total of one hundred and sixty older adults with diabetes who stayed in geriatric homes were identified from residents' medical records of the respective clinic aged between 62 to 87 years with a mean age of  $70.13 \pm 7.73$  years. More than one half of the sample were male, widow, and secondary education. This result may be due to age-related changes in the society and culture. This is in contrast with the result of Singapore studies conducted by Toh, [37] who found that the mean age of the patients was  $80.30 \pm 5.34$  years old, more than half of them were females, and sixty one percent of the patients being single, divorced or widowed.

Over the past fifty years, the family structure has changed dramatically. The results of this study found that most of the elderly population had a family, about one third of them had enough income and about three fifths of all participants were nonsmokers. The results of the present study are consistent with Karen et al., [38] who studied the delivering aging services: stability and change in policies and programs. They concluded that communities and families tend to be nuclear and have higher incomes. This conclusion can be explained by the fact that Egypt has changed socially and culturally. Where all the elderly paid for their residence expenses, whether from them or from the family or social and government support. So, most of them showed that they had enough income.

The primary function of nursing homes is to care for the elderly, and to provide a psychological atmosphere that will enable them to continue their lives in psychological safety. The results of the current study revealed that the mean value for the duration of the participants stay in the geriatric home was four years (table 2). This result may due to changes of family, health and desire for a quality of life. This result was consistent with Sangar et al., [39] who studied the old age satisfaction concerning the geriatric home services in Erbil city. They calculated the average duration of staying in the geriatric home. It was ranged from one to six years among sixty eight percent of the sample for their study. While varied with the results of the current study Kelly et al., [40] at U.S. who studied the duration of stay for older adults residing in the geriatric homes at the end of life and noticed that there was a large differences in median length of stay were observed by gender and net worth (all  $p < 0.001$ ).

The onset of diabetes in elderly affects both length of life and health status due to devastating and life-threatening long-term complications. Current study results indicated that the participants have been diagnosed with diabetes for six years. This result disagreed with the study done by Kalyani, [41] who reported that patients had long diabetes duration from fifteen to twenty four years in his study on the diabetes and aging: unique considerations and goals of care. But the results of the present study agreed with Gebremedhin, [42] who studied the health related quality of life and its interrelated factors among adult patients with type 2 diabetes mellitus attending Mizan Tepi university teaching hospital, Southwest Ethiopia. He reported that the median duration of the disease for the study members was five years. Also, older adults with diabetes have the highest percentage for major lower extremity amputation [43].

Despite many efforts to combat the disease, the factors that lead to hospitalization by diabetes are many.

Few patients manage to control their condition with lifestyle changes. However, the current study confirmed that the patients who are supported and raise their self-efficacy, most of them enjoyed not entering the hospital. Perhaps this result demonstrates that the appropriate lifestyle for people with diabetes can prevent many complications. The results of the present study differed with Qattan, [44] who studied the factors influencing variations in hospitalization for diabetes with hypoglycemia. Who pointed out that there are many diabetics are admitted to the hospital and do not control diabetes [2]. The program had been effective in improving the knowledge level among older adults with diabetes, but it would be more effective if the information can be delivered regularly [45].

The current study is considered one of the first Egyptian studies in the field of nursing educational program based on applied theory of self-efficacy and evaluation of clinical results on diabetic foot among the elderly in geriatric homes. Education in old age is a difficult thing that may produces unsatisfactory results that need strength, enhance and continuous effort to change and sustain a certain behavior. The researchers conducted knowledge of foot care tests with methods that are appropriate for the elderly and what they face hearing and vision problems and may the low level of education. The present study showed that a significant increase in the mean of total knowledge of foot care score for the study group throughout the study period, as the mean score was  $7.29 \pm 9.31$  before the program and became  $44.48 \pm 5.93$  and  $38.95 \pm 6.73$  immediately and three months post-program respectively. This is similar to the results from the study conducted by Desalu et al., [46] and Tharek et al., [47] about the relationship between self-efficacy, self-care behavior and glycaemic control among patients with type 2 diabetes mellitus in the Malaysian primary care setting, who found that most of the studied sample suffered from poor knowledge. In contrast, findings of the study conducted by Hu et al., [48] to assess the knowledge about diabetes among older adults with diabetes in Beijing, China and demonstrated that there are many factors associated with the increased levels of diabetes knowledge.

Concerning the diabetes foot self-care behavior, the results shown that there was a significantly increased from baseline and week-4 follow-up for the intervention group. Similarly, it was demonstrated by other studies that the diabetes foot self-care behavior scores increased after three months intervention commenced [47,37]. In addition other studies mentioned that, there was a significant difference in the foot care behavior scores and in the total mean score of behavior for the study group [48,49]. This result may be due to individual dependence on others. Also, the current study results reported that there was a statistically significant improvement in the total knowledge and belief scores was observed for the study group rather than the control group. This is in the same line with the results of the studies conducted by Dedefo et al., [50] who assess the self-care practices regarding diabetes among the diabetic patients in West Ethiopia. They found that application of the program was effective in improving the behavior and practice among the studied sample.

Generally, the present study revealed that the self-efficacy program affected on the elderly people and it was effective in increasing the knowledge, beliefs and practices regarding diabetic foot self-care. The majority of the study and control group before implementation of the program reported poor knowledge, unsatisfactory practice and low self-confidence. While, after implementation of the program there was a statistically significant improvement in the total knowledge, practice and self-confidence scores was observed for the study group rather than the control group. This is in the same line with the results of the studies conducted by Hurley & Shea [51] about the self-efficacy strategy to enhance diabetes self-care. The highlighting made both on the concepts; self-efficacy and self-care, operational have content validity and measurement reliability and may be used in practice settings to obtain pre-treatment information and to evaluate the outcomes. Also, Aljasem & Peyrot [52] studied the impact of barriers and self-efficacy on self-care behaviors among the diabetic patients. Attentive on the person's self-perceived ability to attain a behavior should be incorporated into an expanded health belief model. Recently the results of the current study were in consistent with the research accomplished by Tharek et al., [47] who studied the relationship between self-efficacy, self-care behavior and glycaemic control among the diabetic patients in the Malaysian primary care setting. This study demonstrated that higher self-efficacy was correlated with improved self-care behavior and better glycaemic control.

Regarding to the total foot care outcome expectation, the previous intervention studies confirmed similar findings, reporting an improvement in the diabetes foot self-efficacy scores before and after implementation of the intervention program [26,47]. However, the finding from this recent study is inconsistent with other studies done by Sharoni et al., [2] who found that the acceptability rate was moderately high. At post-intervention, foot self-care behavior ( $p < 0.001$ ), foot self-efficacy (efficacy-expectation) ( $p < 0.001$ ), foot care outcome expectation ( $p < 0.001$ ), knowledge of foot care ( $p < 0.001$ ), quality of life (physical symptoms) ( $p = 0.003$ ), fasting blood glucose ( $p = 0.010$ ), foot hygiene ( $p = 0.030$ ) and a hydrosis ( $p = 0.020$ ) showed significant improvements. Such intervention studies are recommended to be further evaluated with a more rigorous design. For the foot care outcome expectation, the present findings indicated that the scores increased at week-4 and week-12 following the

program. This finding is similar with a previous study; however, the intervention involved general measures of diabetes self-care education [53].

Concerning the correlation between total score of knowledge, behavior, self-efficacy and outcome expectation about foot care and study characteristics of the studied groups pre and 3 months post program, the present study found an improvements in the foot self-care behavior, foot care self-efficacy (efficacy-expectation), foot care outcome expectation, and knowledge of foot care following the program. Foot self-care behavior improved after twelve weeks following the education program (table 7). The findings were in line with the previous interventional studies conducted on foot self-care among the older population with diabetes. Also, table eight found that there was a significant positive correlation between the educational level, occupation and duration of stay in G.H. and total knowledge score among the study group pre and three months post-program ( $p < 0.05$ ). This means that knowledge score increased for educated elderly however, general self-efficacy had a significant positive correlation with educational level and diabetic duration [54,6,55]. This result is agreement with the Bandura's theory [12]; outcome expectation is about a person's belief in achieving positive outcomes when he/she performs a given behavior.

### **Acceptability of the study**

The majority of the respondents in the present study reported that the program was effective, beneficial, and enjoyable. They perceived this program as a good way to prevent diabetic foot problems. The acceptability score was highly acceptable, and the finding was similar to a pilot study conducted on foot self-care educational intervention among patients with diabetes in Malaysia [2].

## **V. Conclusion**

Based on the findings of the present study it can be concluded that, the educational preventive program based on self-efficacy model was effective and increased the studied elderly knowledge, preventive beliefs and practices regarding foot self-care.

## **VI. Recommendations**

### **Thus, the current study recommended that:**

1. The nurses working with the elderly people need to design educational programs to enhance good behaviors to prevent diabetic foot.
2. Community, medical surgical and geriatric nurses has to undertake their role as an advocator for provision and maintain availability of adequate and efficient preventive care to overcome barriers as cost, unavailability of services and poor relationship.
3. Further researches are needed with a large sample size to generalize the results.

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