

Diabetic Foot - related Knowledge, Health Beliefs and Practices among Diabetic Elderly

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Abstract

Background: Diabetes mellitus has become one of the majors, and rising diseases affecting population all around the world. The most common complications that rise from the diabetes is diabetic foot. The increasing rate in diabetic foot among elderly has become a challenge that continues to rise and worsen. **Aim:** the study aimed to assess diabetic foot-related knowledge, health beliefs and practices among diabetic elderly. **Study design:** descriptive design was utilized in this study. **Setting:** this study was conducted at the diabetes and endocrine outpatient clinic at Beni-suef university hospital. **Subject:** non-probability purposive sample of 70 diabetic elderly, admitted to the previously mentioned setting were recruited for conducting this study. **Data collection tools:** **First tool:** Structured interviewing questionnaire, it was composed of four parts, **part one:** Socio-demographic data, **part two:** Medical history of the elderly, **part three:** Elderly' knowledge regarding diabetes, and diabetic foot, **part four:** Health belief model constructs. **Second tool:** Foot self-care observational checklist. **Results:** Regarding elderly' knowledge, the current study shows that, nearly three quarters (74.3%) of the elderly had unsatisfactory knowledge and only 25.7% had satisfactory knowledge. As regards health beliefs the current study depicts that, more than two-thirds (67.1%) of the elderly had negative health beliefs, while 32.9% had positive health beliefs. The present study also shows that, three fifths (60%) of the elderly had poor level of foot self-care practices. The current study represents that, there was a positive highly statistically significant correlation ($P=0.00$) between total elderly knowledge, total health beliefs, and total foot self-care practices. **Conclusion:** Diabetic elderly in the current study lacked appropriate knowledge and health beliefs regarding diabetes disease in general and diabetic foot in specific and foot self-care practices were mostly unsatisfactory. **Recommendations:** Conducting and disseminating educational programs at various settings to reach all targeted diabetic elderly to increase their positive behaviors towards diabetic care in general and foot care in specific, provide specialist educator nurse in the diabetes clinic to assess the elderly' health needs and provide them with necessary information. Further researches in the area of diabetic foot as well as diabetes prevention and care should be encouraged.

Key words: Diabetic foot, Knowledge, Health beliefs, Practices, Elderly

Introduction

Aging is a natural biological process which is associated with deterioration of health status of elderly people. As aging progress, an inevitable change in each of the body's organs

contribute to the body's declining functions. It diminishes reserves in most body systems and increases vulnerability to most diseases and death. Elderly people constitute a vulnerable group that needs special care. In Egypt, retirement begins at the age of 60 years in governmental, public and private sector

jobs. Some consider the geriatric age group as that group of people who passed the retirement age. Today, about two-thirds of all older people are living in the developing world; by 2025, it will be 75% (*Abo el-Fetoh et al.,2017*).

Diabetes mellitus (DM) is a common chronic disease affecting older people, and it is becoming a global health concern. The International Diabetes Federation (IDF) reported that 425 million people diagnosed with DM in 2017, the number is projected to rise to 642 million by 2040 and the number of diabetic elderly is expected to increase to 252.8 million by 2035. The prevalence of diabetes is expected to increase exponentially in the next 20 years for developing countries. High prevalence of DM is associated with increase in its complications among diabetic elderly (*Sharoni et al.,2017; IDF, 2017*).

Diabetic foot problems as one important complications of DM constitute an increasing public health problem and are a leading cause of hospital admission, amputation and mortality in diabetic patients, the peak prevalence being between 60 and 80 years of age. Worldwide, approximately 40-60% of all non-traumatic amputations of the lower extremities are performed in patients with diabetes. The causal lesions that often result in chronic ulceration and amputation of the lower extremities have been termed the diabetic foot. This is defined as infection, ulceration, and destruction of deep tissues, associated with neurological abnormalities (loss of pain sensation) and various degrees of peripheral vascular disease in the lower limb (*El-Sedawy & Behairy,2016;Marzouk et al.,2017*).

Foot complications that related to diabetes could be preventable through

appropriate control of blood sugar with proper medications and enhancing the good lifestyle habits thus decreasing the risks of microvascular complications. Also, routine foot examination and using good footwear would prevent diabetic foot ulcer and prevent the expected complications. Major foot complications were present among diabetic patients with poor awareness, health beliefs and practices pattern. The education of diabetic patients could prevent foot complications and facilitate healing process. In addition to that, beliefs playing an important role in determining risky behaviors in patients with diabetes so changing the health belief is the milestone for behavior change which contributes to improve health status (*Alhabshan et al.,2017*).

Community health nurses have an accountability to assist and support elderly people to recognize their health related experiences and to enhance their abilities to make informed choices. Nurses have an effective role in prevention of foot ulcers and lower limb amputation by educational interventions, screening high-risk people and providing health care, they can assess elderly's perceptions of risk; this enables nurses to apply strategies that influence them to make healthy lifestyle changes that play a positive role in compliance with a therapeutic regimen and prevent further complications and consequences of diabetes (*Waheida et al., 2015*).

Significance of the study

In Egypt, according to central agency for public mobilization and statistics,(CAPMS) the number of older persons reached 6.410 million in 2018, which constitute 6.7% of the total population, and this percentage expected to rise to 11.5% in 2031. Diabetes in

older age is becoming a public health problem even in developing countries. In Egypt, diabetes is on the growth. The IDF has estimated the total cases of Type2 diabetes (T2D) among the Egyptian adults (20-79 years) in 2017 with more than 8 million patients and the number has been suggested to double in the next 2 decades. In Egypt, T2D is the sixth cause of mortality, responsible for 2.4% of all years of life lost, and represents the sixth most important cause of disability burden (*Hamdy et al.,2018; CAPMS, 2018*).

Aging is associated with a wide range of changes that increase the susceptibility to diabetes complications. One important complications of DM is the foot problems, which constitute a leading cause of death in diabetic elderly. The alarming fact is that Egypt has more diabetic individuals than any other country, and the incidence of foot problems and amputations among elderly remains very high. This can be easily attributed to several factors prevalent in Egypt, such as inadequate diabetes self-care practices, illiteracy, low socioeconomic status, and lack of knowledge regarding diabetic foot problems. The latter is very pertinent to Egypt since more than 90% of diabetic people do not receive education on foot problems (*Abd-Allah et al.,2016;Moussa & Gida, 2017*).

Diabetic foot can be prevented through proper foot education, which is best provided by a multidisciplinary diabetes care team. Understanding knowledge, health beliefs and practices of diabetes may help in designing an effective intervention program for those living with diabetes (*Adejoh,2014*).Therefore, this study was conducted to assess diabetic foot related knowledge, health beliefs and practices among diabetic elderly.

Aim of study

This study aimed to assess diabetic foot related knowledge, health beliefs and practices among diabetic elderly through :

1-Assessing elderly' knowledge toward diabetes in general and diabetic foot specifically.

2- Assessing elderly' health beliefs toward diabetes and diabetic foot.

4- Assessing elderly' practices toward foot self- care.

Research Questions:

What's the level of elderly' knowledge toward diabetes and diabetic foot?

What are the elderly' health beliefs toward diabetes and diabetic foot ?

What are the elderly' practices regarding foot self- care?

Subjects and Methods

.Research design: descriptive research design was utilized to meet the aim of the study.

Technical design:

A- Research Setting: the present study was conducted at the diabetes and endocrine clinic at Beni-suef university hospital.

B- Subjects: non probability purposive sample was used in the current study. The number of diabetics who visited the clinic was 436 (from registration record) through the year 2017. In 2018 the flow rate of cases per day in

the clinic was 1-8 cases both type I and type II DM (either newly diagnosed or follow-up cases). The sample size was calculated using the following equation:

Whereas: Population Size = N |
Margin of error = e | z-score = ze is

$$Sample\ Size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

percentage, put into decimal form. The z-score is the number of standard deviations a given proportion is away from the mean. At 0.05, desired confidence interval was used at 80% power and 10% expected drop out. The sample size was 77 elderly both male, and female, patients with inclusion criteria containing those who are aged 60 years and above, free from foot ulcer, and other complications in their feet, willing to participate in the study and able to comprehend and communicate. 10% (7) of the subjects were excluded in a pilot study.

Tools for data collection:

Tool (1): Structured interviewing questionnaire was developed by the investigator, it includes;

Part I: Socio-demographic characteristics of the elderly, such as age, gender, marital status, occupation, monthly income, level of education, and residence.

Part II: Medical history of the elderly including age of onset of DM, duration of DM, associated comorbidity, current treatment and family history of diabetes disease.

Part III: Concerned with elderly' knowledge about diabetes in general and diabetic foot specifically.

Scoring system: for part III elderly knowledge; each correct answer was scored by one grade and each wrong or "don't know" answer was scored by Zero, a total of 50% and above were considered satisfactory and less than 50% were considered unsatisfactory.

Part IV: Health belief model scale (HBMS). It was adapted by the investigator and involved the main four constructs: perceived susceptibility (9 items), perceived severity (9 items), perceived benefits (9 items), and perceived barriers (12 items).

Scoring system: The scale included 39 items on a three points Likert scale for each variable. All statements were scored on a scale from 1-3. Elderly responses were scored as follows: agree =3, neither agree nor disagree = 2, while disagree = 1 for all parts of the scale except the part of the perceived barriers was coded as the following agree=1, neither agree nor disagree=2, disagree =3. The optimal total scores were 117 and subjects who reach 50% and more considered to have positive response and who got less than 50% otherwise considered to have negative response.

Tool (2): Diabetic elderly' foot self-care practices observational checklist was developed by the investigator to collect information regarding foot care practiced by the elderly.

Scoring system: It was composed of 18 items. The scores of each item ranged from 0-1, zero for not done and one for done. The total practical scores were divided into two categories, practices of 50% and more referred to good practice while practices less than 50% referred to poor practice.

Field work:

Approval was obtained from the authorities of the faculty of nursing, Ain Shams university, then written official letters sent to the director of the Beni-Suief university hospital about the study. Permission from chief of outpatient clinics in Beni- Suief university hospital to conduct the study was obtained as well as permission from head of medical and endocrinology department in the hospital.

Content validity: To achieve the criteria of trustworthiness of the data collection tools in this study, tools were tested and evaluated for content validity. Content validity was tested by five experts in community health nursing and medicine specialties. They were from different academic categories, i.e., professor and assistant professor from faculty of nursing and medicine in Ain shams and Beni-Suef university. To ascertain relevance, clarity, applicability, and completeness of the tools. Based on experts comments and recommendations, minor modifications had been made such as rephrasing and rearrangements of some sentences.

Reliability: Cronbach's Alpha test was used to measure the internal consistency of the 2 tools used in the current study.

Pilot study: A pilot study was carried out on 10% (7) of elderly to test the study tools for clarity, feasibility, applicability and time required to fill out the questionnaires. The necessary modifications were done through omission of unneeded or repeated questions and improvements were made prior to data collection according to the pilot study results. The sample of the elderly who participated in the pilot study was excluded from the main study sample.

Data collection procedure: The investigator attended the diabetes and endocrine outpatient clinic two days per week, from 9.00 AM. to 1.00 PM. The data collection lasted over three months starting from the beginning of January to the end of March 2018. The investigator interviewed each elderly individually and briefly explained the nature and the purposes of the study, and asked for participation. All elderly were informed that participation is voluntary, and the possibility of withdrawing at any time, after obtaining the acceptance of elderly to participate in the study. The elderly were interviewed to assess their socio-demographic data, their knowledge and health beliefs regarding diabetes, diabetic foot, and their practices regarding foot self-care. The average time needed to fill out the questionnaires was 25-30 minutes. A number of interviewed elderly per week ranged from 1-5.

Statistical Design:

The collected data were organized, analyzed using appropriate statistical significant tests. The data were collected and coded using the Computer Statistical Package for Social Science (SPSS), version 20, and was also used to do the statistical analysis of data to evaluate the studied subject's changes throughout the study phases (pre, post & follow-up). Data were presented using descriptive statistics in the form of frequencies and percentages. Chi-square tests were used to compare frequencies and correlation between study variables. Degrees of significance of results were considered as follows: p -value > 0.05 not significant, p -value ≤ 0.05 Significant, p -value ≤ 0.01 highly Significant.

Results

Table (1): shows that; 84.3% of the elderly their ages ranged from 60 to less than 65 years old with mean age 64.44 ± 3.65 , 62.9% were females. Regarding occupation, 58.6% housewife. As regards to monthly income, 61.4% didn't earn enough monthly income.. In relation to level of education, 48.6% were illiterate and 22.7% had university education. 74.3 % of elderly in the sample belonged to rural areas.

Table (2): illustrates distribution of the elderly according to their medical history; Regarding the age at which the patient was diagnosed as DM, 74.3% of them had DM at age < 60 years. As regards to duration of diabetes, 44.3 % had a duration of disease less than 5 years. 65.7% of the elderly had associated comorbidity with DM and 77.1% of them depending on oral tablets. Regarding family history, 51.4% had family history of DM.

Table(3): The table shows that; 67.1% of the elderly had negative health beliefs toward diabetes and diabetic foot and only 32.9% had positive health

beliefs.

Table (4): shows that; there were statistical significant relations ($P<0.05$) between elderly' total knowledge score and their level of education and residence. However, there were non statistical significant relations ($P>0.05$) between elderly' total knowledge score and their ages and gender.

Table (5): shows that; there were statistical significant relations ($P<0.05$) between elderly' total health beliefs and their level of education and residence, but there were non statistical significant relations ($P>0.05$) were found regarding age and gender.

Table (6): shows that; there were statistical significant relations ($P<0.05$) between elderly total foot care practices score and their level of education and residence. But there were non statistical significant ($P>0.05$) relations were observed as regards age and gender.

Table (7): represents that, there was a positive highly statistically significant correlation ($P=0.00$) between total elderly knowledge, total health beliefs and total foot self- care practices.

Table(1): Distribution of the elderly according to their socio- demographic characteristics (n=70).

Socio-demographic characteristics	N	%
Age		
60<65	59	84.3
65<75	8	11.4
>75	3	4.3
Mean \pmSD	64.44 \pm 3.65	
Gender		
Male	26	37.1
Female	44	62.9
Occupation		
Housewife	41	58.6
Retired	16	22.8
Working	13	18.6
Monthly income		
Enough	27	38.6
Not enough	43	61.4
Level of education		
Illiterate	34	48.6
Basic and middle level education	20	28.7
University level	16	22.7
Residence		
Rural	52	74.3
Urban	18	25.7

Table (2): Distribution of the elderly according to their medical history (n=70).

Medical history	N	%
Age of onset of DM		
< 30 years	2	2.9
< 40years	9	12.8
< 60years	52	74.3
Above 61years	7	10.0
Duration of diabetes		
< 5years	31	44.3
5-10years	18	25.7
> 10 years	21	30.0
Associated comorbidity		
Nothing	24	34.3
Yes	46	65.7
Current treatment		
Oral tablets only	54	77.1
Insulin Only	16	22.9
Family history of diabetes		
No family history	34	48.6
Yes	36	51.4

Table(3): Percentage distribution of elderly' according to their health beliefs (n=70).

Health beliefs (HBM)	Negative		Positive	
	N	%	N	%
Perceived susceptibility	47	67.1	23	32.9
Perceived severity	48	68.6	22	31.4
Perceived benefits	45	64.3	25	35.7
Perceived barriers	47	67.1	23	32.9
Total HBM	47	67.1	23	32.9

Table(4):Relation between elderly' total knowledge and their socio-demographic data(n=70).

Demographic data	Elderly' total knowledge			T-test or ANOVA		
	Mean	±	SD	T or F	P-value	
Age	60-65	37.21	±	18.65	0.06 ^t	0.95
	66 or more	36.80	±	22.42		
Gender	Male	40.84	±	18.89	1.25 ^t	0.22
	Female	34.96	±	19.12		
	Illiterate	24.58	±	6.44		
Level of education	Basic and middle level	36.67	±	14.50	73.12 ^F	0.000
	University level	64.43	±	13.05		
Residence	Rural	28.48	±	10.9	10.14 ^t	0.000
	Urban	62.17	±	15.21		

Table(5):Relation between elderly' total health beliefs and their socio-demographic data(n=70).

Demographic data	Elderly' total health beliefs			T-test or ANOVA		
	Mean	±	SD	T or F	P-value	
Age	60-65	43.76	±	19.77	0.40 ^t	0.69
	66 or more	41.14	±	21.04		
Gender	Male	43.49	±	20.12	0.04 ^t	0.96
	Female	43.27	±	19.91		
Level of education	Illiterate	30.88	±	8.94	46.65 ^F	0.000
	Basic and middle level	44.04	±	19.23		
Residence	University level	68.99	±	10.63	-11.53 ^t	0.000
	Rural	33.93	±	13.19		
	Urban	70.58	±	4.39		

Table(6):Relation between elderly' total foot self care and their socio-demographic data(n=70).

Demographic data	Elderly' total foot care practices			T-test or ANOVA		
	Mean	±	SD	T or F	P-value	
Age	60-65	38.70	±	20.32	0.96 ^t	0.34
	66 or more	32.32	±	20.0		
Gender	Male	39.96	±	21.32	0.71 ^t	0.047
	Female	36.36	±	19.74		
Level of education	Illiterate	23.37	±	7.95	5038 ^F	0.000
	Basic and middle level	42.50	±	21.42		
Residence	University level	62.15	±	5.82	-8.15 ^t	0.000
	Rural	29.38	±	16.44		
	Urban	61.73	±	5.68		

Table(7): Correlation between elderly' total knowledge, health beliefs and foot care practices (n=70)

Items	Total elderly' knowledge	
	R	P-value
Health beliefs	0.84	0.00**
Foot care practices	0.73	0.00**

* Statistically significant

** Highly statistically significant

Discussion

Older diabetic clients' education on appropriate foot care has the potential to play a key role in preventing complications. Understanding the factors that contribute to sub-optimal behavioral outcomes in the foot care is important. So educating diabetic patients increase their knowledge of diabetic foot care and help bridge the gap between knowledge and integrated into daily activities (*Mohamed et al., 2016*).

Regarding socio-demographic characteristics of the elderly. Our study revealed that, majority of the elderly their ages ranged from 60 to less than 65 years old with mean age 64.44 ± 3.65 and more than three fifths of the elderly were females and less than three quarters of them were married. As regards monthly income and occupation, more than three fifths of the elderly didn't have enough monthly income and more than half of them were housewife, In relation to level of education, and residence, nearly half of the elderly were illiterate and less than three quarters of them belonged to rural areas (**Table, 1**). This was in conformity with a previous study in Egypt by *Mohamed et al. (2016)* who studied the effect of diabetic foot care training program on elderly adults' outcome in El-Minia Governorate, Egypt, stated that, less than three quarters of the elderly their ages between 60 years to less than 75 years with a mean age \pm SD 65 ± 4.8 , more than half could not read and write and the majority of the sample was married and live in rural areas.

According to medical history. Our study indicated that, less than three quarters of elderly had DM at age > 60 years and the highest percentage had a duration of disease less than 5 years. Less than two-thirds of the elderly had

associated comorbidity with DM, more than three quarters depending on oral tablets only and more than half of them have family history of diabetes (**Table 2**). This result in the same line with the study by *Mohamed et al. (2016)* in El-Minia Governorate, Egypt, stated that, less than half of the elderly had diabetes at age from 41 to 60 years and less than two thirds had a duration of disease less than 5 years. Also, similar to study in Turkey by *Kaya and Kitiş (2018)* who examined elderly diabetes patients' health beliefs about care and treatment for diabetes, they clarified that, more than three quarters were taking oral anti-diabetic medications, about half had a family member with DM and more than three quarters had a disease accompanying diabetes.

Regarding to elderly' knowledge about diabetes in general and diabetic foot in specific, the current study showed that, nearly three quarters of the elderly had unsatisfactory level of knowledge (**Figure,1**). This finding compatible with *Edison and Ali (2017)* who conducted study to assess awareness on risk factors for diabetes mellitus and diabetic peripheral neuropathy among the nationalities of Egypt and Saudi Arabia, they illustrated that, majority of the subjects of nationalities of Egypt have low knowledge on DM. Also, study conducted by *Abd-Allah et al. (2017)* about assessment of health promoting behaviors among elderly diabetics at outpatient diabetic clinic in Helwan, Egypt, they indicated that, more than three quarters of elderly diabetics had inadequate knowledge about foot complications. Another study done by *Marzouk et al.(2017)* about foot care knowledge assessment among type 2 diabetic patients attending three family medicine centers in Cairo, Egypt, the study stated that, more than half of the

studied participants had poor foot care knowledge. In contrast, other studies done by **Al-Qaddah et al. (2016)** in Jordan, **Mariam (2017)** in Ethiopia, **Mustafa et al. (2017)** in Lahore and **Karmakar and Mandal (2018)** in West Bengal reported that, knowledge of diabetic patients about diabetes, diabetic foot and diabetic foot care was satisfactory. The similarity between the current finding and Egyptian studies might be explained by common share of the cultural background of diabetic patients in Egypt as values, beliefs, attitudes, level of knowledge and practices despite their geographic variation.

Regarding elderly' health beliefs toward diabetes and diabetic foot, the current study depicted that, more than two-thirds of the elderly had negative health beliefs toward diabetes and diabetic foot (**Table 3**). This result in accordance with **Baghianimoghadam et al. (2011)** who conducted study in Iran to assess foot care in diabetic patients, based on health belief model and found that, the mean grade score of perceived severity of patients about complications of foot lesions in all groups with different levels of education was middle,. Also, the previous mentioned study by **Kaya and Kitiş (2018)** showed that the median of value for health belief model scale indicated negative health beliefs among the elderly diabetes patients. Kartal, in an interventional study on diabetes patients, most of whom were aged 50 years or older; found that the patients had negative health beliefs about their disease before they were offered education (**Kartal& Özsoy, 2014**). According to investigator opinion, the negative health beliefs of the elderly in the current study could be due to the diabetic elderly don't know the seriousness of diabetes and its future complications and also showed that participants did not accept that they are

high risk in foot lesions and amputations.

Regarding foot self-care practices, the current study finding indicated that, three fifths of the elderly had poor level of practices (**Figure2**). This finding agreed with study conducted by **Abd-Allah et al. (2016)** in Zagazig City, Egypt, they found that, the practice of foot self-care among elderly diabetic patients proved to be low. Also, in agreement with the current finding, **Al-Sayah et al. (2015)** in a study carried out in Canada on adult patients with type-2 DM, the study showed that the practice of self-care was low particularly in the foot self-care. Also, study conducted in India by **Selvakumar and Shah (2016)** to assess awareness and practice regarding foot self-care among patients of known type 2 diabetes mellitus in a rural area, they found greater proportion of diabetes patients had a poor foot care awareness and practices. Similar study conducted by **Shaker (2017)** in unpublished M.Sc thesis entitled as "biopsychosocial needs of patients with post diabetic foot amputation" in Beni-Suef health insurance hospital and found that, majority of the patients had unsatisfactory foot care practices. The current study emphasized the need to address the problem of diabetic foot self-care as demonstrated by the low number of people performing foot care practice, this is certainly due to lack of training in such skills, which is also an essential role of nurses in the management of diabetes. This highlights the need for foot care education and training to limit the complications, and improve practices.

Regarding relations between elderly' total knowledge score and their socio-demographic data, the current study showed that; there were statistical significant relations ($P < 0.05$) between elderly' total knowledge score and their level of education and residence.

However, there were non statistical significant relations ($P>0.05$) between elderly' total knowledge score and their ages and gender (**Table 4**). This finding was supported by **El-Khawaga and Abdel-Wahab (2015)** who conducted study to assess knowledge, attitude, practice and compliance of diabetic patient in Dakahlia, Egypt, the study indicated that, the significant independent predictor of good knowledge regarding diabetes were education, working status and urban resident. This finding also in agreement with study conducted in Saudi Arabia by **Alhabshan et al. (2017)** about assessment of knowledge toward complications of diabetic septic foot among diabetic patients, they reported that, the good awareness was significantly associated with higher educational levels, but there was no correlation between knowledge with age and gender. In addition, study conducted by **Wickramasinghe and Siritunga (2016)** in Sri Lanka to assess type II DM related foot problems and knowledge, practices related to foot care among type II DM patients, the study showed that, poor educational status significantly associated with poor knowledge of foot care and there was no significant association of sex and age with foot care knowledge. According to the investigator opinion, in the current study the significant association between elderly knowledge and level of education could be due to the fact that people with higher education are more likely to understand, use health information resources and having a better chance to get information from courses and social media than those who are illiterate.

Concerning relations between elderly' total health beliefs and their socio-demographic data, the current study showed that; there were statistical significant relations ($P<0.05$) between

elderly' total health beliefs and their level of education and residence, but there were non statistical significant relations ($P>0.05$) between elderly' total health beliefs and their ages, and gender (**Table 5**). This finding coherent with study conducted in Turkey by **Kaya and Kitiş (2018)** they showed that, the diabetic elderly with higher education levels had higher scores for health belief model sub-scales, and the study did not show a significant relation between health beliefs about treatment of diabetes and age, gender. Also, finding of the present study congruent with **Kartal and Özsoy (2014)** who conducted study about effect of planned diabetes education on health beliefs and metabolic control in type 2 diabetes patients. The study revealed that, the elderly with higher education levels had higher scores for health belief model and it's sub-scales. The finding of the current study could be due to higher education levels have positive effects on health beliefs.

In the current study, there were statistical significant relations ($P<0.05$) between elderly total foot care practices score and their level of education and residence. But there were non statistical significant ($P>0.05$) relations between elderly' total practice score and their ages, and gender (**Table 6**). This finding in a harmony with study in Ethiopia by **Tassew (2015)** about assessment of diabetes self-care practice and it's associated factors among patient on follow-up, he showed that, educational status showed significant statistical association with good diabetes self-care practice whereas age and gender did not have statistical association with diabetes self-care practice. Moreover, study by **El Din et al.(2016)** to assess prevalence of risk factors for Egyptian diabetic foot ulcer in upper Egypt Governorates, stated that, diabetic patients who were

illiterate/secondary school graduate, work as farmer, from rural areas have severe potential risk for diabetic foot ulcer. This could be explained by the investigator as those diabetics who lived in the rural area had poor awareness about personal hygiene and foot self-care practice, and they often walk with bare feet. This may expose their feet to harm and lead to the development of foot ulcer.

Additionally, the current study represented that, there was a positive highly statistically significant correlation between total elderly knowledge and total health beliefs (**Table 7**). Similarly, study by **Purwanti and Nurhayati (2016)** in Indonesia entitled as "Improving the compliance of patients type 2DM to foot care with health belief model approach" showed that the threats, seriousness, vulnerability, and consideration of the advantages and disadvantages are influenced by patient knowledge and experience of the subject. Moreover, study developed by **Morowatisharifabad et al.(2018)** to assess predictors of healthy nutrition behaviors among elders based on health belief model, stated that, there was a significant positive correlation between knowledge of the elders and their health beliefs. The finding of the current study might be due to knowledge can play an essential role in shaping individuals' health beliefs and participation in proper health maintenance practices.

Moreover, the current study represented that, there was a positive highly statistically significant correlation between total elderly' knowledge and total foot self-care practices (**Table 7**). This comes in agreement with **Saad et al.(2014)** in study conducted in Egypt, revealed that, knowledge score improvement was significantly correlated to positive change of foot care practice score. Moreover,

Karmakar and Mandal (2018) who studied knowledge and practice of foot self-care among the patients with diabetes mellitus in selected hospitals of Kolkata, India, they demonstrated that, there was a significant association between patients' educational status regarding diabetes and practice of foot-self care. This also was agreed with study in Iraq by **Saber and Daoud (2018)** they reported that, better foot care practice can be achieved by better knowledge about foot care practices, and this study showed a significant association between them, in which the practice score was higher among patients with higher knowledge score. The finding of the current study could be explained by the investigator opinion as the link between knowledge score change and practice change is logic as the patients who gained more knowledge change are more likely to improve their practice regarding foot health.

Conclusion

Based on the findings of this study, it can be concluded that,

Diabetic elderly in the current study lacked appropriate knowledge and health beliefs regarding diabetes disease in general and diabetic foot in specific and foot self-care practices were mostly unsatisfactory. The study shows that, there were statistical significant relations ($P < 0.05$) between elderly' total knowledge score and their level of education and residence. However, there were non statistical significant relations ($P > 0.05$) between elderly' total knowledge score and their ages and gender. There were statistical significant relations ($P < 0.05$) between elderly' total health beliefs and their level of education and residence, but there were non statistical significant relations ($P > 0.05$)

were found regarding age and gender. Also, there were statistical significant relations ($P < 0.05$) between elderly total foot care practices score and their level of education, and residence. But there were non statistical significant ($P > 0.05$) relations were observed as regards age and gender. There was a positive highly statistically significant correlation between total elderly knowledge, total health beliefs, and total foot self-care practices.

Recommendations

The results of this study projected the following recommendations:

- ❖ Conducting educational programs based on health belief model for diabetics to determine educational needs and to evaluate effectiveness of education offered to help diabetes patients to develop positive health beliefs and to increase their positive behaviors towards diabetic care in general and foot care in specific.

- ❖ It's important to provide specialized health educator nurse in the diabetes clinic to assess the elderly' health needs and provide them with necessary information, developing and disseminating medical posters or pamphlets to raise the health awareness among the elderly.

- ❖ Regular continuing self-care programs should be designed to enhance elderly skills' ability to care for their foot with emphasis on the most important risk factors and appropriate management. Special attention should be directed to those with low socio-economic and educational levels.

- ❖ Further researches in the area of

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

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