

Relation between Health Locus of Control and Foot Self-Care for Elderly with Type II Diabetes Mellitus

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Abstract

Background: Health locus of control emerged as a strong predictor of foot self-care in diabetic elderly as it plays a major role in educating elderly about foot self-care. The aim of the study: -was to assess the relation between health locus of control and foot self-care for elderly with type II diabetes mellitus. Subjects and Method: Study design: A descriptive study design was used. Study setting: This study was conducted at endocrinology and diabetic clinic at Al-Shamla clinics of Tanta University. Study subjects: A convenience sampling was utilized. The total number of the studied subjects was 230. Tools of data collection: Four tools were used. Tool (1): structured interview schedule which included three parts: - part (1): Socio- demographic characteristics of the elderly, part (2): Medical history, and part (3): Knowledge about foot care. Tool (2): The Simplified 60 Second Diabetic Foot Screening. Tool (3): Diabetic Foot Self-Care Behavior Scale. Tool (4): Multidimensional Health Locus Control. Results: More than three-quarters (75.2%) of the studied elderly had an unsatisfactory practice, 79.93% had an internal health locus of control, 76.00% had a powerful health locus of control, and 65.17% had a chance health locus of control. Conclusion: The study concluded that there was significant relation between health locus of control and foot care of the elderly. Recommendations: This study recommended that, nurses and counselors should focus on the locus of control in their interventional courses and programs to enhance internal locus of control to improve foot self-care practices.

Key words: Health locus of control, Foot self-care, Elderly

Introduction

Type II diabetes mellitus (DM) is a lifelong metabolic disease, characterized by hyperglycemia, and occurs when the body is resistant to insulin or sufficient insulin level is not produced. Type II diabetes, has become one of the main threats to human health in the 21st century. This disease has become one of the global health problems and the main cause of death and disability as its vascular complications during lifetime lead to the huge increase of heart attacks and strokes, kidney failure, blindness, diabetic foot and amputation⁽¹⁾.

The International Diabetes Federation (IDF) and the World Health Organization (WHO) estimated the worldwide incidence of diabetes at more than 422 million people and predicted an increase to 642 million by 2040 and it would be the seventh leading cause of death in 2030^(2,3). In Egypt, Central Agency for Public Mobilization and Statistics (CAPMAS) in (2019), reported the number of type

II diabetics reached 39 million and about 8.6 million of them were elderly persons. Egypt ranks as the 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⁽⁴⁾. Diabetic foot is a serious disabling complication of type II diabetes mellitus as it may lead to unhealed injuries in lower limb and impending amputation. Diabetic foot is defined as infection, ulceration, or destruction of tissues of the foot of a person with currently or previously diagnosed diabetes mellitus, usually accompanied by neuropathy and/or Peripheral Artery Disease (PAD) in the lower extremity. Diabetic foot has a tremendous economic and social impact on individuals, families and on health system as a whole in developing and developed countries⁽⁵⁾. The most important risk factors for foot ulceration are peripheral neuropathy, peripheral vascular disease, foot

deformity, previous foot ulceration, and amputation of the foot or leg. In addition, recurrent chronic abrasions, minor abrasions, bullae, various irritations, verrucas and calluses, improper cutting of toenails, fungal infection, poor foot hygiene, inappropriate footwear use, poor glycemic control and bad metabolic control are the most common causes of foot ulcer formation in diabetic elderly⁽⁶⁾. Therefore, an effective management of diabetes requires self-care behaviors such as dietary control, regular exercise, and glycemic control, promoting diabetic foot self-care⁽⁷⁾.

A previous study at Dubai (2019), has shown that 20.0% of diabetics never check their feet on the week, and about 15.0% of them reported never drying after washing their feet⁽⁸⁾. So, promotion of diabetic foot self-care is strongly recommended as part of preventive strategies for Diabetic Foot Ulcers (DFUs), and re-ulcerations in diabetes type II elderly with or without DFUs. Practices for

promotion of diabetic foot self-care include daily foot inspection, toe and nail care, regularly inspect and feel the inside of shoes for any areas that could rub and cause tissue damage, regular washing of feet and careful drying particularly between the toes to reduce the risk of fungal infections, regular application of emollients to reduce dry skin, callus build up or fissuring (cracking) of the skin, cutting nails straight across and avoiding cutting into the corners of the nails, avoiding using anything abrasive on the feet, obtain appropriate foot wear, avoid sitting close to heaters or fires, and never walk barefoot inside or outdoors to prevent injury⁽⁹⁾.

All elderly with type II diabetes should do routine foot exams by the screening clinician annually to identify diabetic foot complications and to prevent DFU, or re-ulceration of a DFU, and promoting foot health⁽¹⁰⁾. Additionally, lifestyle behavior changes are required, including physical activity, optimizing metabolic

control, monitoring blood glucose levels, monitoring of blood pressure, eliminating smoking, and adherence to medication to prevent DFU in the long run⁽¹¹⁾.

People generally differ in their perceptions of the amount of control which they have over their lives. Locus of control as a psychological construct is based on Rotter's social learning theory formed in 1954, and then introduced by Wallston et al., as the health locus of control theory in the 1970s. Rotter defines the concept of locus of control as a person's belief about location of forces which control their lives. It is the person's level of belief to the fact his or her health is controlled by internal or external factors⁽¹²⁾.

Individuals with an internal health locus of control (IHLOC) believe that their direct actions and behaviors determine their health status. On the contrary, powerful others locus of control (POLOC) is characterized by individuals believing that powerful

others such as doctors, nurses or family members exert power over their own health. Finally, chance health locus of control (CHLOC) is characterized by individuals believing that chance, luck or fate exerts power over their health⁽¹³⁾.

Diabetic elderly having internal locus of control believes that their own efforts and dedication can bring changes around them and in their conditions thus implicating the future as one's own responsibility. Such belief makes them more confident, strong and motivates to get control over illness. On the contrary, elderly with external locus of control, possess a belief that the events are beyond their control and whatever is happening is just a matter of fate, destiny, luck, in the control of powerful others or unpredictable. Such elderly has been found to be very passive with a perceived sense of helplessness, does not try to change their conditions and believes that they can do nothing with the matters/events they are facing by. Hence, identifying diabetic patients with

internal, external, and chance attributiostyles can help identify their behaviors to better control the disease⁽³⁾

Community health nurse plays an essential role in empowering diabetic patients to better manage and preventing their disease through self-care and improving the quality of life through providing them and their families with the needed information. Nurses as care providers should consider client-centered care and effective communication with clients and their families through health education programs and instructing their diabetic elderly patients about increase risk of lower extremity complications and refer those patients to routine schedule of foot care. Promptly preventive foot care should be performed as early as possible in order to cut down number of lower limbs infections and future amputations⁽¹⁴⁾.

Significance of the study

Diabetes is a fast-growing health problem in Egypt with a serious effect on morbidity, mortality, and health

care resources. Diabetic foot complications are considered to be a serious consequence of this disease⁽¹⁵⁾. Most of these complications could be prevented or managed by proper foot care by the elderly or their care givers depending on their perceived health locus of control. So, the community health nurse should identify the perceived health locus of control in order to stimulate the development of a proactive attitude of diabetic patients in relation to their foot self-care⁽¹⁶⁾. Therefore, the aim of this study was to assess the relation between health locus of control and foot self-care for elderly with type II diabetes mellitus.

The aim of this study was to:

Assess the relation between health locus of control and foot self-care for elderly with type II diabetes mellitus.

Research question:

What is the relation between health locus of control and foot self-care for elderly with type II diabetes mellitus?

Subjects and Method

Study design:

A descriptive study design was used to conduct this study.

Study settings:

This study was conducted at endocrinology and diabetic outpatient clinic at Al-Shamla clinics of Tanta University Hospital.

Study subjects:

A convenience sampling was utilized in this study. The total number of the studied subjects of diabetic elderly was 230 (133 male and 97 female). The sample size and power analysis was calculated using Epi-Info software statistical package created by World Health organization and Center for Disease Control and Prevention, Atlanta, Georgia, USA version 2002.

Study tools:

Four tools were used in this study to collect the necessary data.

Tool I: Structured interview

schedule:

It was included the following parts

Part (1):- Socio-demographic characteristics of the elderly with diabetes mellitus

This part included data about age, sex, marital status, level of education, previous occupation, residence area, family income and principal caregiver.

Part (2): Medical history of the elderly with type II diabetes mellitus

Medical history of the elderly included: number and causes of previous hospital admission, other chronic diseases, duration of DM, type of treatment and medications received, regularity of doing fasting blood test analysis, checking blood sugar level at home, as well as regularity of doing a cumulative glucose test. History also included compliance with ordered medication, adherence with diabetic diet regimen and exercise, problems for self-care capacity as suffering from impaired vision, ability to reach feet, previous or current problems with the feet, and assessment of current foot wear condition.

Part (3): Knowledge of the elderly with diabetes mellitus about foot care (KOFC)

Knowledge of foot care (KOFC) was developed by Eigenmann et al. (2011)⁽¹⁷⁾, and it was adapted by the researcher in this study. It aimed to assess patient's knowledge about foot care, it consisted of 14 multiple choice questions (MCQ), and it included

A- Elderly knowledge regarding diabetic foot risk factors and its signs, it was about normal fasting blood glucose level, well-managed diabetes decreases its complications, causes of the occurrence of foot ulcers in diabetic elderly, and signs of diabetic foot problems among diabetic elderly. This part contained four questions.

B- Knowledge of the elderly about foot problems from diabetes and lack of foot care, it was one question about problems of diabetic foot in the elderly with type 2 DM.

C- Knowledge of the elderly about the behaviors followed for the prevention of diabetic foot and promoting foot care behaviors, it was about benefits of regular exercise, times per week of doing exercise, duration needed for medical check-up of feet nerves, importance of keeping blood glucose level at normal range, caring of diabetic foot, techniques of self-examination of the feet of the diabetic elderly, points to consider by diabetic elderly when wearing shoes and when wearing socks, and reasons for seeking medical checkup. It included nine questions.

Scoring system of knowledge

Questions that the elderly chose one answer only

- Correct answers scored as one point.
- Incorrect answers and didn't know scored as zero point

Questions that the elderly chose more than one answer

- Correct and complete answers scored as two points.

- Correct and incomplete answers scored as one point.
- Incorrect answers and didn't know scored as zero point.

The total score was obtained by summing the scores of all items. A higher score indicated a high level of knowledge about foot care. The total score ranged from 0–25.

The total score for knowledge was categorized as follows

- High knowledge: > 70% (18-25) of the total score.
- Moderate knowledge: 50-70 % (13-17) of the total score.
- Low knowledge: <50% (Less than 12) of the total score

Tool II: Screening for the high-risk diabetic foot: The Simplified 60 Second Tool⁽¹⁸⁾

The simplified 60 second tool was developed by In low's 60-second diabetic foot screen, and it was adopted by the researcher in this study. This tool was designed to facilitate early detection and appropriate

treatment of diabetic foot ulcers. It consisted of

Medical history of foot ulcer

Elderly was asked, if they had any previous ulcers and/ or previous amputation in both feet.

Physical examination

Both feet were checked for the presence of any deformity, ingrown toenail, and palpate each foot for absence of pedal pulses (dorsalis pedis and/ or posterior tibial).

Foot lesions

Both feet were checked for active ulcers, blisters, calluses, and fissures

Neuropathy of feet

Monofilament test was used to assess loss of protective sensation (LOPS) in the feet of elderly with diabetes, Monofilament test has been widely used in clinical practice for diabetic peripheral neuropathy (DPN) screening owing to their availability and convenience, as well as, it was inexpensive assessment which was sensitive in identifying elderly at risk for developing foot ulcers⁽¹⁹⁾.

The researcher tested 10 sites on each foot (Nine plantar sites which were distal great toe, third toe, and fifth toe, first, third, and fifth metatarsal heads, medial foot, lateral foot, and heel and one dorsal site by using Semmes –Weinstein 5.07 (10 gram) monofilament. The total score was 10/10⁽²⁰⁾.

- If all sites were tested and the elderly felt the monofilament in each of the areas, the score was 10/10.
- If the monofilament was not felt in an area on the foot, this indicated loss of protective sensation (LOPS) in that area and required referral to a physician.
- The researcher recorded the number of positive results out of the number of sites tested, e.g. 6 / 9 indicated that the elderly felt the monofilament in six areas and only nine areas were tested as the elderly's had an amputation in one of the places

of examination, callus or ulcers⁽²¹⁾.

Results of screening

- a) Positive screen results when there were one or more “Yes” responses.
- b) Negative screen results when there were all “No” responses.

Level of risk for diabetic foot

1. **High risk:** presence of any of the following: - previous ulcer, previous amputation, active ulcer, ingrown toenail.
2. **Moderate risk:** presence of any of the following: - deformity, peripheral vascular disease, absent pulse.
3. **Low risk:** presence of any of the following: -neuropathy 4/10 negatives on monofilaments, callus, blister.
4. **No risk:** no positive findings.

Tool III: Assessment of reported practices of diabetic elderly regarding their foot care by using diabetic foot self-care behavior scale (DFSBS)

Diabetic foot self-care behavior scale (DFSBS) was developed by Chin et al. (2013)⁽²²⁾, and it was adapted by the researcher in this study. It contained eight 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, breaking in new shoes, and checking shoes. Scoring system ranged between 0-8. The score for each behavior was calculated as follows: done scored "one", not done scored "zero".

Scores for all practices were summed up. The total practice score was eight. A higher score indicated good foot self-care behavior. It was converted into a percent score and classified into:

- **Satisfactory practice:** >60% (> 4) of the total practice score.
- **Unsatisfactory practice:** ≤ 60% (≤ 4) of the total practice score.

Tool VI: - Multidimensional Health Locus Control (MHLC)

Multidimensional health locus control was developed by Wallston and Wallston (1978)^(23, 24), it was adopted by the researcher in this study, and it contained three subscales: internal HLC (IHLC), powerful others HLC (PHLC), and chance HLC (CHLC). Each subscale measured an individual's tendency to believe that health outcomes were due mainly to one's own behavior (IHLC), or to powerful others such as medical professionals or family (PHLC), or to chance (CHLC). PHLC and /or CHLC were classified as (external) belief, and IHLC as (internal) belief. The MHLC contained eighteen questions. Each subscale contained six questions. For each question, elderly chosen one out of five answers ranged from 1 = strongly disagree, 2 = moderately disagree, 3 = do not know, 4 = moderately agree, and 5 = strongly agree.

Score was categorized as follows

The possible score range was 6 to 30 on each subscale. Subjects were classified as Internal Health Locus of Control, Powerful Others or Chance Locus of Control, depending upon which locus of control score was the highest.

Method

1- Obtaining approval

Before conducting the study, official letter was directed from the Dean of Faculty of Nursing to the Director of Endocrinology and Diabetic Clinic in Al-Shamla Clinics of Tanta University Hospital to obtain his permission in order to facilitate the work of the researcher to collect the data from selected setting.

2- Ethical and legal considerations

- a. Approval of ethical committee of Faculty of Nursing, Tanta University was obtained before conducting the study.
- b. An informed consent was taken from all selected patients

after providing appropriate explanation about the purpose of the study.

- c. The researcher ensured that the nature of the study didn't cause any harm or pain for the entire subjects.
- d. Every diabetic elderly was ensured about the privacy and confidentiality of all information collected.

3- Developing the tools of data collection

Study tool (I) was developed by the researcher based on literature review. Tools II and III of the study were adapted by the researcher. Tool IV was adopted by the researcher in this study, and then they were translated into Arabic languages.

4-The study tools were tested for face and content validity by a jury of five expertise in the field of Community

Health nursing before conducting the study.

5- A pilot study

A pilot study was carried out by the researcher on 10% of the sample (23 diabetic elderly) for testing the tools for its clarity, applicability and to identify obstacles that may be encountered with the researcher during data collection. Accordingly, the necessary modification was done. This sample was excluded from the study sample.

6- Reliability of the study tools was done by

Cronbach's Alpha which was 0.761 for a structured interview schedule, 0.951 for the simplified 60 second diabetic foot screening tool, 0.892 for reported practices for diabetic elderly regarding their foot care, 0.802 for multidimensional health locus of control, and 0.825 for all sheet items.

7- Actual study

- The data were collected by the researcher over a period of six months starting from October 2020 to the end of March 2021.

- Each diabetic elderly was interviewed individually at outpatient department of Endocrinology and Diabetic Clinic in Al-Shamla Clinics of Tanta University Hospital
- The researcher met the diabetic elderly only two days per week (Sunday and Wednesday) in the waiting areas of Endocrinology and Diabetic Clinic in Al-Shamla Clinics of Tanta University Hospital.
- Each diabetic elderly was informed about the purpose of the study.
- The questionnaire was filled by the researcher according to the answers of diabetic elderly.
- The average number of each diabetic elderly per day ranged from 3-5 cases.
- The average time spent for collecting data from each elderly ranged from 30-45 minutes.

8- Statistical analysis

The collected data were organized, tabulated and statistically analyzed

using SPSS software statistical computer package version 26. For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, comparison was done using Chi-square test (χ^2). For comparison between means for two variables in a sample, paired samples T-test was used. For comparison between means for more than two variables, the F-value of analysis of variance (ANOVA) was calculated.

Correlation between variables was evaluated using Pearson and Spearman's correlation coefficient r. A significance was adopted at $P < 0.05$ for interpretation of results of tests of significance (*). Also, a highly significance was adopted at $P < 0.01$ for interpretation of results of tests of significance (**).

Results

Table (I): Represents the distribution of the studied elderly patients with type II diabetes according to their socio-demographic

characteristics. The table shows that, 41.3% of the studied diabetic elderly were in the age group 60-<65years and nearly one- third (33.0%) of them aged 65-<70 years, with a mean of age of 66.78 ± 4.728 years. The table shows that, 57.8% of them were males and the rest (42.2%) were females. Nearly two- thirds (64.3%) of the studied diabetic elderly were married, 31.7% of them were widow and the rest (3.9%) of them were single and divorced. The table represents that, slightly more than two- thirds (69.1%) of the studied diabetic elderly were from rural area. More than half (59.6 %) of them were illiterates, 19.6 and 11.3% of them could read and write and had general / technical secondary education respectively. Concerning the occupation of the studied diabetic elderly, nearly one- third (33.0%) were not working and house wife, 22.6% ,19.1%, and 12.2% respectively were governmental employees, farmers,

and had professional work. About 63.5% of the diabetic elderly had enough income per month, 30.9% of them had not enough income per month, and the rest (5.7%) of them had enough and saving income per month. Nearly three -quarters of the elderly (73.9%) live with spouse and children, only 12.6% of them live with spouse, and the rest (7.8% and 5.7%) live alone and with a relative respectively. Also, more than half (55.7%) of the elderly their children were responsible care giver, more than one- third (40.4%) of them their spouse was the care giver.

Table (II): Represents the distribution of the studied elderly patients with type II diabetes according to their total level of knowledge about foot care (KOFc). The table represents that, (42.6% and 37.0% respectively) of the studied diabetic elderly had a high and moderate level of knowledge and the rest (20.4%) of them had a low level of knowledge.

Table (III): Represents the distribution of the studied elderly patients with type II diabetes according to their risk for diabetic foot using the simplified 60-second tool. The table shows that, 69.1% of the studied diabetic elderly had a high risk for diabetic foot, 13.5% and 10.9% of them had a low and moderate risk respectively, and the rest (6.5%) of them had no risk of diabetic foot.

Table (IV): Shows the percent distribution of the studied elderly patients with type II diabetes according to their total practice level towards foot care by using diabetic foot self-care behavior scale (DFSBS). The table represents that, 75.2% of the studied elderly had an unsatisfactory practice level, and 24.8% of them had a satisfactory practice level. The total practice level of them regarding their foot care ranged from (0-8) with a mean of 3.98 ± 0.592 .

Table (V): Represents the total mean scores of dimensions of health locus of control among the studied elderly patients with type II diabetes. The table shows that most (79.93%) of the studied elderly with type II diabetes had an internal health locus of control with a mean of (23.92±1.32), 76.00% of them had a powerful health locus of control with a mean of (22.80±2.04), while, 65.17% of them had a chance health locus of control with a mean of (19.55±2.56).

Table (VI): Represents the percent comparison and correlation between total level of knowledge of the studied elderly patients with type II diabetes and their severity level for diabetic foot, and their total practice level. The table illustrates that there was highly statistically significant negative correlation between severity levels for diabetic foot and levels of knowledge of the studied elderly with type II diabetes ($r = - 0.239$, $P = 0.000$). Moreover, the table shows that, there was highly statistically significant positive correlation between total practice level and levels of knowledge of the studied

elderly with type II diabetes ($r = 0.410$, $P = 0.000$).

Table (VII): Represents the relation between the total scores of multi-dimensional health locus of control domains (MHLC) of the studied elderly patients with type 2 diabetes and their severity for diabetic foot and practice levels towards their foot care. The table shows that, there was statistically significant relationship between risk of foot problems and score gained for internal health locus of control, where, those with high score of internal health locus of control were at moderate risk for diabetic foot and those with high score for chance and powerful health locus of control were significantly at high risk for diabetic foot. Moreover, the table illustrates that, there was significant relation between internal health locus of control and foot care practice of the elderly, where, those with satisfactory practice gained high score of internal health locus of control. Furthermore, those with unsatisfactory practice gained high score at chance and powerful health locus of control

Table (I): Percent distribution of the studied elderly patients with type II diabetes according to their socio–demographic characteristics

Socio demographic characteristics of diabetic elderly	The studied patients (n=230)	
	No	%
Age (in years)		
▪ 60-<65	95	41.3
▪ 65-<70	76	33.0
▪ ≥70	59	25.7
Range	(60-81)	
Mean ± SD	66.78±4.728	
Sex		
▪ Male	133	57.8
▪ Female	97	42.2
Residence		
▪ Rural	159	69.1
▪ Urban	71	30.9
Marital status		
▪ Married	148	64.3
▪ Widow	73	31.7
▪ Single & Divorced	9	4
Educational level		
▪ Illiterates	137	59.6
▪ Read and write	45	19.6
▪ General/Technical secondary	26	11.3
▪ University/Post	14	6.1
▪ Elementary education	8	3.5
Occupation before retirement		
▪ Not work/Housewife	76	33.0
▪ Governmental employee	52	22.6
▪ Farmer	44	19.1
▪ Professional	28	12.2
▪ Private works	19	8.3
▪ Craftsman	11	4.8
Elderly income per month		
▪ enough	146	63.5
▪ Not enough	71	30.9
▪ Enough and saving	13	5.7

Whom the elderly lives with		
▪ Spouse and children	170	73.9
▪ Spouse	29	12.6
▪ Alone	18	7.8
▪ With a relative	13	5.7
Responsible care giver		
▪ Children	128	55.7
▪ Spouse	93	40.4
▪ Brother & Sister	9	3.9

Table (II): Percent distribution of the studied elderly patients with type II diabetes according to their total level of knowledge about foot care (KOFC)

Level of knowledge	The studied patients (n=230)	
	No	%
▪ Low	47	20.4
▪ Moderate	85	37.0
▪ High	98	42.6

Table (III): Distribution of the studied elderly patients with type II diabetes according to their risk for diabetic foot using the simplified 60-second tool

Risk for diabetic foot	The studied patients (n=230)	
	No	%
▪ No risk	15	6.5
▪ Low risk	31	13.5
▪ Moderate risk	25	10.9
▪ High risk	159	69.1

Table (IV): Percent distribution of the studied elderly patients with type II diabetes according to their total practice level towards their foot care by using diabetic foot self-care behavior scale (DFSBS)

Total practice level	The studied patients (n=230)	
	No	%
▪ Unsatisfactory	173	75.2
▪ Satisfactory	57	24.8
Range	(0-8)	
Mean ± SD	3.98 ± 0.592	

Table (V): Total mean scores of dimensions of health locus of control among the studied elderly patients with type II diabetes

MHLC dimensions	The studied patients (n=230)			
	No items	Mean ± SD	Mean Percentage %	Ranking
1. Internal health locus of control	6	23.92±1.32	79.73	1
2. Chance health locus of control	6	19.55±2.56	65.17	3
3. Powerful health locus of control	6	22.80±2.04	76.00	2
Total MHLC score	18	66.27±3.68		

Table (VI): Percent comparison and correlation between total level of knowledge of the studied elderly patients with type II diabetes and their severity level for diabetic foot, and their total practice level.

	The studied patients (n=230)						χ^2 P
	Level of knowledge						
	Low (n=47)		Moderate (n=85)		High (n=98)		
	N	%	N	%	N	%	
Severity level for diabetic foot							
▪ No risk	2	4.2	4	4.7	9	9.2	10.08 0.121
▪ Low risk	3	6.4	12	14.1	16	16.3	
▪ Moderate risk	2	4.2	9	10.6	14	14.3	
▪ High risk	40	85.2	60	70.6	59	60.2	
r , P	-0.239 , 0.000**						
Total practice level							
▪ Unsatisfactory	45	95.7	67	78.8	61	62.2	20.06 0.000*
▪ Satisfactory	2	4.3	18	21.2	37	37.8	
r , P	0.410 , 0.000**						

r: Pearson' correlation coefficient

* Significant at level P < 0.05.

** Highly significant at level P < 0.0

Table (VII): Relation between total scores of multi-dimensional health locus of control domains (MHLC) of the studied elderly patients with type 2 diabetes and their severity for diabetic foot and practice levels towards their foot care.

	The studied patients (n=230)		
	Mean ± SD		
	MHLC domains		
	Internal health locus of control	Chance health locus of control	Powerful health locus of control
Severity level			
▪ No risk	24.80±3.726	18.27±4.217	21.33±4.047
▪ Low risk	24.81±2.868	19.97±4.363	22.03±5.050
▪ Moderate risk	25.44±3.267	16.76±3.491	20.40±4.865
▪ High risk	23.43±3.283	20.03±4.596	23.46±4.104
F , P	4.151 , 0.007*	4.412 , 0.005*	4.702 , 0.003*
r , P	-0.228 , 0.000**	0.115 , 0.082	0.210 , 0.001**
Total practice level			
▪ Unsatisfactory	23.28±3.335	20.03±4.549	23.44±4.355
▪ Satisfactory	25.86±2.445	18.07±4.195	20.84±4.087
t , P	28.864 , 0.000*	8.300 , 0.004*	15.706 , 0.000*
r , P	0.526 , 0.000**	-0.280 , 0.000**	-0.341 , 0.000**

t: Paired sample t-test

F: ANOVA F-test

r: Pearson/Spearman' correlation coefficient

* Significant at level P < 0.05.

** Highly significant at level P < 0.01.

Discussion

Type II Diabetes mellitus (T2DM) is a highly prevalent metabolic disorder which has lifelong acute and chronic complications constituting a huge global public health burden ⁽²⁵⁾. Diabetic foot is a serious disabling complication of type II diabetes mellitus as it may lead to unhealed injuries in lower limbs and impending amputation. Complications from diabetic foot compromise patients' health and quality of life and contribute to excess mortality, increasing the physical, psychological, and financial burden of the disease on patients and the community ⁽⁹⁾. Previous studies have shown that diabetic foot problems are principally associated with improper foot self-care. So, foot self-care behavior can help to reduce foot problems and diabetic foot complications among elderly ⁽²⁶⁾.

In diabetic elderly, health locus of control emerged as a strong predictor of foot self-care as it plays a major role

in promoting health and educating elderly about foot self-care. Identification of health-related locus of control may become an essential tool to guide health actions directed toward foot self-care. This provides important support for a better understanding of the psychosocial factors involved in the difficulties faced during the management of diabetic elderly and promoting their foot care practices ⁽³⁾. Community health nurse should design interventions to promote foot self-care behaviors in elderly with type II diabetes focusing on addressing health locus of control and incorporate them in a plan of care that is consistent with the elderly's expectations for treatment as well as their ability to sustain healthy behaviors ⁽¹⁴⁾. So, the aim of this study was to assess the relation between health locus of control and foot self-care among elderly with type II diabetes mellitus.

The result of the current study revealed that, less than half of the studied

diabetic elderly were in the age group 60-<65years, nearly one- third of them aged 65-<70 years, and about one-quarter of them aged ≥ 70 years (**Table I**). This study agreed with a study done in Assuit city by **Mahmoud et al. (2019)** ⁽¹⁴⁾ , who showed that about three-quarters of their participants their age ranged from 60- 70 and the rest of them were 70 or more. On the other hand, the result of the present study disagreed with a study done by **Ewais et al. (2019)** ⁽²⁷⁾ , who showed that the majority of the elderly their ages ranged from 60 years to less than 65 years old. Also, the present study disagreed with a study done by **Shin et al. (2018)** ⁽²⁸⁾ , who found that less than one- fifth of the studied elderly were in the age group 61-70 years old, more than half of them aged 71-80 years, and more than one quarter of them were in the age ≥ 81 . These results can be attributed to the fact that type II diabetes is prevalent among over 45 years population.

Regarding the sex of the studied diabetic elderly, the result of the current study showed that, more than half of them were males and the rest were females (**Table I**). That may be due to although the incidence of type 2 DM is more among females but male patients may be more concerned about treatment follow up. Also, it may be possible that diabetic female elderly may be in need for their husbands or their sons for treatment permission due to the physical disabilities and aging process. This study is in the same line with a study done by **Giandalia et al. (2019)** ⁽²⁹⁾ , who revealed that more than half of them were males and the rest were females. While, the result of the present study disagreed with a study done by **Abredari et al. (2015)** ⁽³⁰⁾ , who revealed that the incidence of type 2 DM increased in female patients and increased with age and stated that more than half of them were females and the rest were males. Furthermore, the result of the present study disagreed with a study done by

Fardazar et al. (2017)⁽³¹⁾ and another study done by **Kamaru Zaman et al. (2018)**⁽³²⁾, who revealed that more than half of their participants were females.

Regarding elderly residence, the result of the current study showed that, slightly more than two-thirds of the studied diabetic elderly were from rural area (**Table I**). This may be due to the study was conducted at endocrinology and diabetic outpatient clinic at Al-Shamla clinics of Tanta university hospital which serve many villages of Tanta city and other governorates such as Kafr El-Sheikh and its villages and the rural population had low medical services in their places so, they prefer to go to Tanta University Hospitals to receive medical services. The current study is in the same line with a study done by **Ewais et al. (2019)**⁽²⁷⁾, who revealed that about three - quarters of the studied elderly were from rural area. The results of the present study is in contrast with a study done by

Ebrahim et al. (2016)⁽³³⁾, who found that more than two-thirds of the studied diabetic elderly were from urban area. This variation may be attributed to the difference of the study setting.

Concerning to marital status, the finding of the present study showed that nearly two-thirds of the studied diabetic elderly were married, nearly one-third of them were widow (**Table I**). This result may be due to that the subjects in the present study were community residents and live with their families, as nearly three-quarters of elderly in the present study live with their spouse and children and their responsible care giver was their children for more than half of them. This result could be due to that the subjects live in the community and their families were the main care giver. This finding of the study is in the same line with other studies done by **Ebrahim et al. (2016)**⁽³³⁾, **Kamaru Zaman et al. (2018)**⁽³²⁾, and **Serag (2017)**⁽³⁴⁾, who stated that about three-

quarters of the studied elderly were married, one-fifth of them were widowed. Meanwhile, the result of the present study disagreed with a study by **Alqahtani et al. (2020)**⁽³⁵⁾, who found that more than two - thirds were single and divorced and the rest were married.

Regarding to educational level more than half of the studied elderly were illiterates (**Table I**). This result may be due to the study subjects in this study their age was above 60 years and older and their residence area was mainly from rural. This study agreed with four Egyptian studies. A study done in Assuit city by **Mahmoud et al. (2019)**⁽¹⁴⁾, who showed that about two thirds of the studied subjects were not educated, a study done by **Ewais et al. (2019)**⁽²⁷⁾, who showed that about half of the studied elderly were illiterates, a study done by **Ebrahim et al. (2016)**⁽³³⁾, who showed that more than one- third of the studied elderly were illiterates, and a study conducted in Menoufia University,

Egypt by **Salama and Zorin (2018)**⁽³⁶⁾, who found that more than one-third of the patients were illiterates.

Regarding to the diabetic elderly income per month, the results of the present study shows that nearly two-thirds of them had enough income per month, about one - third of them had not enough income per month (**Table I**). This result is in the same line with Egyptian study done by **Alagamy et al. (2019)**⁽³⁷⁾, who revealed that more than three quarters of the studied elderly had enough income, less than one-fifth of them had not enough income per month. The current study disagreed with a study done by **Ewais et al. (2019)**⁽²⁷⁾, who revealed that about two-thirds of the studied elderly didn't have enough monthly income.

One of the most important aspects of the prevention of diabetic foot and the management of diabetic foot ulcer is proper care and prevention of injuries to the foot. This requires diabetic elderly to have proper education,

knowledge and awareness about the basis of proper foot care and management of foot ulcers through simple health education and information.

Furthermore, understanding of the causes of foot diseases in diabetics will enable high-risk elderly to recognize it early. It has been estimated that up to 50% of the major amputations in diabetic patients can be prevented with effective education⁽³⁸⁾.

The result of the current study represented that, about three-quarters of the studied diabetic elderly had either a high or moderate level of knowledge about foot care and the rest of them had a low level of knowledge (**Table II**). This result may be due to long duration of diabetes which may expose them to message from media as television and internet as well as instructions from health professionals about their disease. The results of the current study agreed with other studies done by **Alhabshan et al. (2017)**⁽³⁹⁾, **Alsous et al.,(2019)**⁽⁴⁰⁾, **Ali et al.**

(2019)⁽⁴¹⁾, **Alqahtani et al. (2020)**⁽³⁵⁾, and **Ahmed et al. (2020)**⁽⁴²⁾, who showed that the majority of their participants had high and moderate level of knowledge. However, the result of the present study disagreed with a study done in Cairo, Egypt by **Marzouk et al. (2017)**⁽⁴³⁾ and a study done by **Almuhanadi et al. (2017)**⁽⁴⁴⁾, who revealed that about half of the participants had poor knowledge, more than one-third of them had satisfactory, and the rest of them had good knowledge.

Assessment of foot regularly by a foot specialist as nurse is essential to prevent complications of diabetic foot which is more important once peripheral neuropathy diagnosis is done. Foot lesions can be the presenting feature of type II diabetes, so any patient with a foot ulcer of undetermined cause should be screened for diabetes. Assessment of biomechanical, neurological and vascular status of the foot by comprehensive examination is

important to identify patients at risk and to implement the interventions at the appropriate time⁽⁶⁵⁾. The screening for foot complications should start at the time of diagnosis of diabetes and integrated with sustainable patient education at primary care level by training of health care providers at primary care level⁽⁴⁴⁾.

The results of the screening for diabetic foot in the present study show that, more than two-thirds of the studied diabetic elderly had high risk for diabetic foot and few percentages of them had low and moderate risk (**Table III**). This result may be due to low educational status of the subjects, prolonged disease duration, insulin treatment, presence of callus, fungal infections, and nails problems. Furthermore, most of the elderly were from rural area that is with poor sanitation in the countryside of Egypt with prevalent habit of wearing exposed slippers or walking bare foot. This result of the present study is in the same line with a study conducted

in Elsharkia governorate in diabetic clinic at Zagazig University Hospitals by **Abo elezz et al. (2021)**⁽⁴⁵⁾, who showed that more than two-thirds of the studied participants with type II diabetes mellitus had high risk for diabetic foot and few percentages of them had a moderate risk and a low risk. The results of the present study disagreed with a study done in Kasturba Medical College (KMC), Manipal by **Vibha et al.(2018)**⁽⁴⁶⁾, who found that about half of the studied participant had no risk of diabetic foot, about one-third of them had low risk, and few percentages of them had moderate risk and high risk for diabetic foot.

The practice of foot care measures such as daily foot washing and drying, daily foot examination, proper nail care, and footwear are important in prevention and early detection of the expected complications. Patients with poor practices about diabetic foot care have a higher incidence of diabetic foot complications. Studies suggest

that increasing awareness about diabetic foot care practices may reduce diabetes related foot ulceration and amputations and facilitate healing of foot ulcers⁽⁴⁷⁾.

The current study represented that, more than three- quarters of the diabetic elderly had an unsatisfactory practice level of foot care, and nearly one- quarter of them had a satisfactory practice level (**Table IV**). This result could be related to that most of the studied elderly reported suffering from problems that hinder them from practicing foot care as poor vision, inability to reach the feet as well as lack of psychological motivation. The results of the current study is in agreement with a study done in Malaysia by **Sharoni et al. (2017)**⁽⁴⁸⁾ and a study done by **Alagamy et al .(2019)**⁽³⁷⁾, they revealed that about three-quarters had an unsatisfactory practice and the rest of them had a satisfactory foot care practice. The highest score was for item “I wash between my toes”. This finding is

similar to the current study. It is possible that elderly patients bathe every day and washed their feet during bath times and most of Egyptians are Muslims, they pray five times per day where the feet have to be washed prior praying. Meanwhile, the results of the current study disagreed with **Ahmed et al. (2020)**⁽⁴²⁾, who revealed that more than three- quarters had a satisfactory practice and the rest of them had an unsatisfactory practice.

The current study showed that the percentage of elderly with good practice was poorer than the percentage of those with good knowledge (**Table II and IV**), where about one- quarter of elderly had a satisfactory practice level compared to about half of them had a high knowledge level. This result indicates poor elderly compliance with foot care. Diabetic elderly had some degree of foot care awareness but they didn’t practice what they know. This could be due to lack of motivation and the suffering from poor vision, physical

disabilities, and negligence. This finding agreed with a study done by **Abu-Elenin et al. (2018)** ⁽⁴⁹⁾, who studied knowledge, practice and barriers of foot self-care among diabetic patients at Tanta University Hospitals that reported half of them had good knowledge level, while, about two-thirds of them had inadequate foot self-care practice and lack of motivation, physical limitation, poor vision, low income, and lack of family support were the reported barriers of foot self-care. This agreement may be due to the two studies conducted in the same setting in Tanta University Hospital and the same educational level for the participants in two studies.

Perceptions and beliefs of elderly with T2DM, including health locus of control influence adherence to foot self-care activities. Diabetic elderly who perceives an internal health locus of control have better adherence to diabetes treatment than those who believe their health is controlled by

external factors. Furthermore, elderly who feel responsible for managing their diabetes and put more value on their health are typically more actively engaged in performing the recommended diabetic foot self-care activities ⁽⁵⁰⁾.

The results of the current study showed that, the majority of diabetic elderly had internal health locus of control. This means that the majority of them know that their health is a result of their behaviors and believe that they have control over their own health. More than three-quarters of them believed to powerful others health locus of control. This means that they seek their own health in the hands of health professionals, physicians and families and see themselves less responsible for their own health and disease. Furthermore, about two-thirds of them believed in chance health locus of control. This means that they see their health as a result of good luck and their disease as a result of bad luck and fate (**Table V**).

This could be due to the mean duration of suffering from diabetes was 17.45 years and they know by practice the extent of influence of self-care on the disease. The results of the present study are in agreement with a study done by **Klinovszky et al. (2019)** ⁽⁵¹⁾, who found that the majority of the studied participants had internal health locus of control, more than three-quarters of them had powerful health locus of control, and more than half of them had chance health locus of control. The result of the present study agreed with a study by **Williams et al. (2016)** ⁽⁵²⁾, who revealed that the mean score of internal of control was 25.93 ± 5.66 , powerful health locus of control 23.71 ± 5.65 , and chance health locus of control 17.40 ± 5.90 .

The result of the current study illustrated that there was highly statistically significant negative correlation between risk for diabetic foot and levels of knowledge of the studied diabetic elderly (**Table VI**). As understanding and gaining

knowledge about the factors that affect the incidence of diabetic foot ulcer as foot traumas, mechanical pressures, obesity and overweight and longer diabetes duration and old age decrease the risk level for diabetic foot. The results of the present study is in disagreement with other studies done by **Bikramjit et al.(2015)** ⁽⁵³⁾, **Jalilian et al.(2020)** ⁽⁵⁴⁾, and **Ghobadi et al. (2020)** ⁽⁵⁵⁾, who found that there was no statistically significant correlation between the level of knowledge and severity level.

Moreover, the result of the current study shows that, there was highly statistically significant positive correlation between total practice and knowledge of the studied elderly with type II diabetes (**Table VI**): This means that good knowledge will influence better practice and healthy lifestyle. The result of the present study is in the same line with a study in seoul, korea by **Kim and Han. (2020)** ⁽⁹⁾, who showed that there was

highly statistically significant positive correlation between total practice and knowledge. Furthermore, this study is in the same line with the studies which had been done by **Fatema et al. (2017)**⁽⁵⁶⁾ and **Al-Naggar et al. (2017)**⁽⁵⁷⁾. This study is in contrast with a study done by **Ali et al. (2019)**⁽⁴¹⁾, who showed that there was no significant correlation between total practice and knowledge. From the researcher point of view, it can be concluded that knowledge does not necessarily influence practices towards diabetes as there are other many influencing factors as physical disability, socio-economic factors as well as psychological condition. In addition, studies conducted by **El-Khawaga and Abdel-Wahab (2015)**⁽⁵⁸⁾, and **Serag (2017)**⁽³⁴⁾, did not confirm the present finding and explained that there was a negative significant correlation between the knowledge and practice of foot care.

The result of the current study showed that, there was statistically significant relationship between severity risk of foot problems and score gained for internal health locus of control, where, those with high score of internal health locus of control were at moderate risk for diabetic foot and those with high score for chance and powerful health locus of control were significantly at high risk for diabetic foot (**Table VII**). Moreover, the result of the present study illustrated that, there was significant relation between internal health locus of control and practice of the elderly regarding foot care, where, those with satisfactory practice gained high score of internal health locus of control. Furthermore, those with unsatisfactory practice gained high score at chance and powerful health locus of control (**Table VII**). This means that elderly who believe to have role in their health, had a higher score in foot self-care practices, though, elderly who believe in chance role and

powerful role in their health, had a lower score in foot self-care practices.

This study is in agreement with a study done by **Abredari et al. (2015)**⁽³⁰⁾ and a study by **Albargawi et al.(2016)**⁽⁵⁹⁾, who found that an inverse and significant relationship was seen between self-care behaviors with chance health locus of control and powerful health locus of control and a direct relationship with internal health locus of control and participants who reported having a high internal health locus of control adhered well to their foot self-care regimen. Meanwhile, the result of the present study disagreed with a study done by **Pourhoseinzadeh et al. (2017)**⁽⁶⁰⁾, who revealed that there is no significant relation between internal , external health locus of control and health behaviors.

Diabetic elderly usually seeks treatment and support from doctors who can monitor their medical condition and suggest treatment type and frequency for better control of

glucose. Therefore, despite the high scores they gained on the internal dimension, elderly cannot manage their living without the important guidance of their doctor. Therefore, the elderly in the current study acknowledged the importance of seeing their doctors regularly and following their recommendations in order to control their diabetes. However, this elderly also believed that chance health locus of control may be responsible for whether their diabetes got better or worse ⁽⁶¹⁾. Egyptian culture is based on the Islamic beliefs; therefore, elderly may believe that they have some control over their lives and health, but fatalism controls all life circumstances. Furthermore, Muslim persons believe in predestination, that everything in their lives happens for a reason. However, the Islamic faith also encourages followers to take care of themselves and value their health which is consistent with an internal health locus of control. Islamic

teachings also encourage believers to be responsible and engage in preventive behaviors to promote their health⁽⁶²⁾.

Conclusion

Based on the findings of the present study, it can be concluded that there was significant relation between internal health locus of control and foot care practice of the elderly, where, those with satisfactory practice gained high score of internal health locus of control. Furthermore, those with unsatisfactory practice gained high score at chance and powerful health locus of control.

There was statistically significant relationship between severity risk of foot problems and score gained for internal health locus of control, where, those with high score of internal health locus of control were at moderate risk for diabetic foot and those with high score for chance and powerful health locus of control were significantly at high risk for diabetic foot.

Recommendations

Based on the results of the present study, it is recommended that:

1. Nurses and diabetic educators should be available at each diabetes outpatient clinic and in medical departments and act on increasing internal health locus of control in order to improve elderly's foot self-care behaviors and their involvement in treatment.
2. Nurses and counselors should focus on the locus of control in their interventional courses and programs to enhance internal locus of control to improve foot self-care practices.
3. Foot screening programs should be initiated at basic health units for all diabetic individuals for early risk recognition and intervention.
4. Educational campaigns in both urban and rural health units should be available for diabetic patients focusing on dietary and lifestyle modifications to enhance their internal health locus of control.

5. Instructional guidelines about diabetic foot self-care should be delivered in different forms to elderly ranging from face-to-face education to social media applications and media health campaigns.

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