
ORIGINAL ARTICLE**Enablers and barriers of foot self-care practises among women with type 2 diabetes mellitus in Chengelpet District, Tamil Nadu***Kalaivani Annadurai**Department of Community Medicine, Bharath Medical College and Hospital, Bharath Institute of Higher Education and Research (BIHER), Chennai- 600 073 (Tamil Nadu) India*

Abstract

Background: Self-care practises in diabetes mellitus include self-monitoring of blood glucose, adherence to drug compliance, good dietary practises, regular physical activity and periodic foot examination. Adequate foot self-care practises will greatly reduce the morbidity and mortality associated with diabetic foot ulcers. *Aim and Objectives:* This study was done to assess the knowledge and practise of foot self-care among diabetic women residing in Thiruporur, Chengelpet district. *Material and Methods:* This was a cross-sectional analytical hospital-based study conducted among 110 women attending an urban health center in 2021. *Results:* It was recorded that 84.5% of those in this study mentioned that feet should be inspected daily but only 10.9% inspected their feet daily. The majority (96.4%) of them were having the habit of walking barefoot outside the house. The majority (94.6%) didn't want to self-medicate for corn/callus, blister (100%) and burn or cut (99.1%). Levels of knowledge score were moderate (40%) and high (60%) and the levels of practise for the study population were low (8.2%) and moderate (91.8%). *Conclusion:* This study concluded that even though there was good general knowledge on diabetes observed among the study participants, they were lagging behind foot self-care practises and hence adequate knowledge of self-care practises should be imparted by the treating physician.

Keywords: Self-care, Diabetes mellitus, Foot ulcers

Introduction

With more than 50 million people with type 2 diabetes mellitus, India is considered the diabetic capital of the world because of the epidemiological transition. It constitutes about 5% of general population of India. Being a chronic medical condition, people with diabetes need to follow some life-style modification practises through self-care for better management of their disease status. Complications of diabetes are broadly divided into micro-vascular and macro-vascular complications. Micro-vascular complications are diabetic nephropathy, neuropathy and retinopathy. Macro-vascular complications are cerebro-vascular disease, cardiovascular disease and peripheral arterial disease [1-3].

Self-care practises in diabetes mellitus are defined as 'a set of behaviors practised by people with diabetes in order to successfully manage the disease on their own' [4]. Self-care practises in diabetes include self-monitoring of blood glucose, adherence to drug compliance, good dietary practises, regular physical activity, and periodic foot examination. Previous studies found that adequate knowledge and good foot self-care practises were found to be significantly associated with improved quality of life and a reduction in the incidence of diabetic foot ulcers. It was shown that 50% of foot amputations could be prevented by adequate health education of diabetic patients.

Moreover, it was reported that diabetic patients often neglect their foot care [4-6].

The International Working Group on the Diabetic Foot (IWGDF) is an internationally recognized body and gives guidelines based on evidence-based medicine. According to IWGDF, apart from regular visits to a physician for routine examination, five key elements are recommended as the cornerstone for the prevention of foot ulcers prevention. They are as follows: identifying at-risk foot among diabetics, regular inspection and examination of at-risk foot, educating the patients, family and health care professionals on diabetic care, ensuring appropriate wearing of good fitting foot wear and treating risk factors for diabetic ulcers. Hence, a patient's self-care plays a major role in most of the elements discussed above [7-8]. The National Guideline for the Management of Foot Ulcers in Diabetes by the Ministry of Health and Family Welfare also reinstates IWGDF guidelines and recommends annual, six-monthly, quarterly, or monthly foot examination depending upon risk category [9]. Routine foot self-examination played a major role in the prevention of limb amputation among diabetics, including daily inspection of foot, keeping them clean and dry, and carefully trimming toe nails carefully, wearing appropriate foot wear, regular check-ups with physician and drug compliance [8]. As there was a lack of studies exclusively among women, this study was planned to explore the knowledge and self-care foot care practises among women with type 2 diabetes mellitus in Chengelpet District, Tamil Nadu.

Material and Methods

This was an analytical hospital based cross-sectional study conducted among 110 adult women with diabetes mellitus attending the urban health

and training center, Thiruporur, Kancheepuram district, Tamil Nadu. According to the study by Kushwaha *et al.*, it was reported that the self-foot care practises among diabetic patients were found to be 56.5% and assuming a 10% non-response rate, the final sample size was approximated to 110 $\{n = [Z^2 (1-\alpha/2) p(1-p)]/d^2$, where p – Expected proportion, d – Absolute precision, $(1-\alpha/2)$ – Desired Confidence level.} [4].

Newly diagnosed diabetic patients (less than 6 months duration), critically ill diabetic patients and patients with known diabetic foot ulcers were excluded from the study. Institutional Ethics Committee clearance was obtained socio-demographic characteristics, knowledge, and practise of the study population were recorded in a pre-validated questionnaire during face-to-face interviews after getting informed written consent. Data were collected using a pre-tested and validated questionnaire which was adopted Nottingham Assessment of Functional Foot Care. The questionnaire consisted of three parts, first part contained socio-demographic details; part two consisted of knowledge regarding foot self-care practises and part three consisted of foot self-care practises. Scoring was done for knowledge-based questions and foot self-care practises separately. Good knowledge of foot care indicates total scoring of mean or above on knowledge questions. Poor knowledge on foot care indicates total scoring below the mean on knowledge questions. Good foot care practise indicates a total practise score of $\geq 50\%$ of the maximum score. Poor foot care practise indicates total scoring of $<50\%$ of the maximum score [10-11]. Quantitative data were entered into MS excel; descriptive and inferential statistics were performed using the statistical software SPSS 23 version.

Results

All the participants were female and above 18 years of age. The mean age of the participants was 44.6 ± 2.67 and almost one third (37.3%) of the participants were in the age group between 36 to

Table 1: Socio-demographic profile of the study subjects (n=110)

Socio-demographic profile	n (%)
Age Group	
≤ 25	2 (1.8)
26-35	6 (5.5)
36-45	41(37.3)
46-55	29 (26.4)
56-65	23 (20.9)
≥66	9 (8.2)
Education	
Illiterate	13(11.8)
Primary education	19(17.3)
Secondary education	27(24.5)
Higher secondary	32(29.1)
Diploma	10(9.1)
Graduate	8(7.3)
Professional	1(.9)
Occupation	
Unemployed	28(25.5)
Student	1(.9)
Daily wager or unskilled	38(34.5)
Skilled labour	24(21.8)

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Socio-demographic profile	n (%)
Semi-professional	18(16.4)
Professional	1(.9)
Socio-economic status	
Low Socioeconomic	4(3.6)
Upper lower class	106(96.4)
Type of family	
Nuclear	39(35.5)
Extended nuclear	38(34.5)
Joint family	16(14.5)
Living alone	17(15.5)
Marital status	
Single	1(.9)
Married	86(78.2)
Widower	11(10.0)
Separated	12(10.9)
Religion	
Hindu	87(79.1)
Muslim	5(4.5)
Christian	18(16.4)

45 years. One-fourth (24.5%) of participants had a secondary education, while one-third (34.5%) were of daily wagers from extended nuclear families. Almost three-fourth (78.2%) were married and belonged to Hindu (79.1%) religion (Table 1).

Table 2: Details of diabetes and other co-morbid conditions (n-110)

Disease profile	N (%)	
Duration of diabetes		
≤ 1 year	3 (2.7)	
1- 10 years	102 (92.7)	
11 – 20 years	4 (3.6)	
≥ 20 years	1 (0.9)	
Type of treatment		
Insulin	3 (2.7)	
OHA	107 (97.3)	
Other Co-morbid conditions	Yes	No
Hypertension	60 (54.5)	40 (45.5)
Coronary Heart Disease	8 (7.3)	102 (92.7)
Arthritis	21 (19.1)	89 (80.9)
Others like bronchial asthma, seizures	5 (4.5)	105 (95.5)

The majority of the patients had diabetes for 1 to 10 years and on oral hypoglycaemic agent (97.3%) and all of them had type 2 diabetes mellitus. Hypertension (54.5%) was the major co-morbid condition, followed by arthritis (19.1%) (Table 2).

Participants had low awareness of making the area between their toes dry; only 0.9% knew it correctly, and only 5.5% felt that lotion should not be applied in between toes. Most (93.6%) of the patients felt that one should consult a doctor if there was some injury to their feet (Table 3). The ideal temperature for washing the feet was

mentioned by only 2.7% of the participants and 92.7% mentioned that they didn't know about the water temperature and 4.5% stated it was hot water. And regarding the trimming of toe nails, 87.3% didn't know how to trim the nails and 7.3% stated they were trimming them curved and only 5.5% correctly trimmed their toe nails straight across. All of them were wearing slippers but MCR slippers were used by 10% of the participants. All of them stated that they would change the slippers depending on the wear and tear of the foot-wear.

Table 3: Responses to knowledge questions related to the foot care (n-110)

Knowledge questions	Yes	No	Don't know
Anti-diabetic medications should be taken regularly to prevent complications	86 (78.2)	7 (6.4)	17 (15.5)
Do you feel that feet should be washed daily	102 (92.7)	-	8 (7.3)
Do you feel the temperature of the water should be checked	-	1 (0.9)	109 (99.1)
Do you feel that feet should be completely dried after washing	98 (89.1)	1 (0.9)	11 (10)
Do you feel that talcum powder should be used to keep the areas between the toes dry	1 (0.9)	1 (0.9)	108 (98.2)
Do you feel that lotion or moisturizing cream should be applied on the feet to prevent dryness of skin	52 (47.3)	30 (27.3)	28 (25.5)
Do you feel that lotion should not be applied between the toes	6 (5.5)	78 (70.9)	26 (23.6)
Should feet be inspected at least once a day	93 (84.5)	3 (2.7)	14 (12.7)
Should diabetic patients should wear comfortable shoes/slippers/sandals	95 (86.4)	1 (0.9)	14 (12.7)
Do you know the inside of the shoes/slippers/sandals should be inspected for before wearing them	88 (80.0)	20 (18.2)	2 (1.8)
Can diabetic patients walk bare foot while going outdoors	12 (10.9)	96 (87.3)	2 (1.8)
Diabetic patients should consult a doctor if their feet have redness, blisters, cuts, or wound/s	103 (93.6)	6 (5.5)	1 (0.9)

Regarding practising for foot self-care, the majority (89.1%) of the participants didn't examine their feet at all and the majority of them (98.2%) didn't dry the area between the toes. And the majority (96.4%) of them had the habit of

walking barefoot outside the house. The majority (94.6%) didn't want to self-medicate for corn/callus, blister (100%) and burn or cut (99.1%) (Table 4).

Table 4: Responses to practise questions related to the foot care (n-110)

Foot Self-care practises questions	More than once a day	Once a day	Most days a week	Rarely / Never
Do you examine your feet	3 (2.7)	9 (8.2)	-	98 (89.1)
Do you wash your feet?	104 (94.5)	6 (5.5)	-	-
	Daily/Often	Sometimes	Rarely	Never
Do you check your shoes before you put them on	9 (8.2)	65 (59.1)	4 (3.6)	32 (29.1)
Do you check your shoes when you take them off	2 (1.8)	6 (5.5)	7 (6.4)	95 (86.4)
Do you check whether your feet are dry after washing	2 (1.8)	7 (6.4)	76 (69.1)	25 (22.7)
Do you dry between your toes?	2 (1.8)	-	-	108 (98.2)
	Daily	Once a week	About once a month	Never
Do you use moisturizing cream or lotion or oil on your feet?	24 (21.8)	51 (46.4)	-	35 (31.8)
Do you put moisturizing cream or lotion or oil between your toes?	24 (21.8)	51 (46.4)	-	35 (31.8)
	About once a week	Less than once a month	About once a month	Never
How often do you cut your toe nails?	23 (20.9)	20 (18.2)	65 (59.1)	2 (1.8)
	Daily/Often	Sometimes	Rarely	Never
Do you walk around the house in barefoot?	106 (96.4)	4 (3.6)	-	-
Do you use hot water bottle in bed?	-	-	6 (5.5)	104 (94.5)
Do you use corn (callus) remedies/corn (callus) plasters/paints when you get a corn?	5 (4.5)	1 (0.9)	-	104 (94.6)
Do you put a dry dressing on a blister when you get one?	-	-	-	110 (100.00)
Do you put a dry dressing on a graze, cut or burn when you get one?	-	-	1 (0.9)	109 (99.1)
Do you put your feet near the fire?	-	-	-	110 (100.00)

Knowledge and practise responses were assigned scores based upon the best options for classification. The total knowledge score was 40 and the total practise score was 74. Levels of knowledge was classified into low score (≤ 20), moderate score (21-30) and high score (≥ 31). The mean knowledge score for the study population was 31.01 ± 2.1 with a minimum and

maximum value of 27 and 35 out of 40. Levels of knowledge score were moderate (40%) and high (60%). Similarly, levels of practise was classified into low (≤ 40), moderate (41-60) and high score (≥ 61). Mean practise score was 44.35 ± 2.67 with a minimum and maximum value of 38 and 52 out of 74. The level of practise for the study population was low (8.2%) and moderate (91.8%).

Table 5: Distribution of knowledge and practise level across the socio-demographic and disease profile (n-110)

Variable		Level of Knowledge		Chi-square	Level of Practise		Chi-square
		Moderate	High		Low	Moderate	
Age group	≤ 25	2	0	0.0001	0	2	0.000
	26-35	1	5		0	6	
	36-45	6	35		1	40	
	46-55	11	18		2	27	
	56-65	17	6		0	23	
	≥ 66	7	2		6	3	
Educational status	Illiterate	11	2	0.0001	2	11	0.16
	Primary education	13	6		4	15	
	Secondary education	13	14		0	27	
	Higher secondary	3	29		3	29	
	Diploma	1	9		0	10	
	Graduate	2	6		0	8	
	Professional	1	0		0	1	
Education division	Illiterate	11	2	0.001	2	11	0.28
	Literate	33	64		7	90	
Occupation	Unemployed	17	11	0.014	2	26	0.58
	Employed	27	55		7	75	

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Variable		Level of Knowledge		Chi-square	Level of Practise		Chi-square
		Moderate	High		Low	Moderate	
Type of family	nuclear	5	34	0.000	0	39	0.003
	extended nuclear	18	20		3	35	
	joint family	8	8		1	15	
	living alone	13	4		5	12	
Marital status	single	0	1	0.009	0	1	0.058
	married	33	53		4	82	
	widower	9	2		2	9	
	separated	2	10		3	9	
Religion	Hindu	34	53	0.157	6	81	0.307
	Muslim	4	1		0	5	
	Christian	6	12		3	15	
Duration of Diabetes	≤ 1 year	1	2	0.58	0	3	0.59
	1- 10 years	41	61		8	94	
	11 – 20 years	1	3		1	3	
	≥ 20 years	1	0		0	1	

Age, family type and marital status were all significantly related to level of knowledge and practise score. Educational status and occupation were significantly associated with the level of knowledge alone (Table 5). Furthermore, there was no significant relationship between knowledge level and practise score (p=0.09) (Table 6).

It seems that one's level of knowledge and practise score are positively correlated with r of 0.202 (Fig. 1).

Table 6: Knowledge level and practise score (n=110)

Knowledge level	Practise level		Total
	Low	Moderate	
Moderate	6	38	44
High	3	63	66
Total	9	101	110

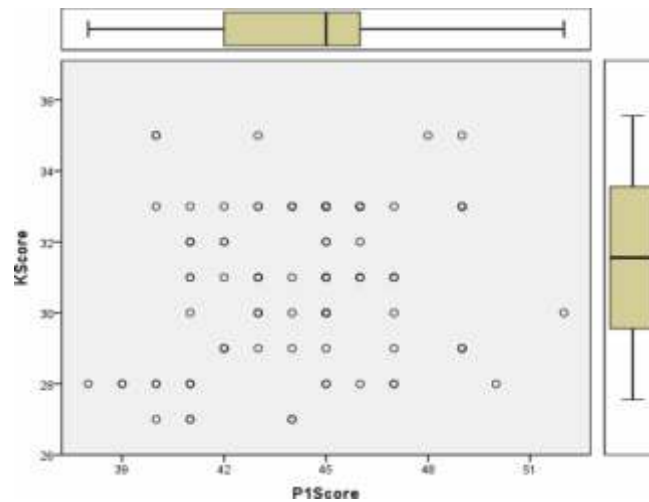


Figure 1: Regression plot between knowledge score and practise score

Discussion

In our study to assess the knowledge and practise of foot self-care among diabetic women residing in Thiruporur, Chengelpet district, it was observed that 92.7% felt that feet should be washed daily. And while 89.1% of the study population in this study believed that the feet should be dried after washing, the study by Subhashini *et al.* [12] found that no one in their study population knew that the feet should be dried after washing in a hospital based study in rural India. On the other hand, only 0.9% knew that talcum can be used in between the toes to keep the toes dry. And 84.5% of this study mentioned that feet should be inspected daily but the study by Subhashini *et al.* found that no one in the study population knew that they had inspect their own feet daily. This might be due to a difference in sample size, geographical region or gender differences [12].

In the current study, the majority (89.1%) didn't examine their feet daily among the patients. On the other hand, in a cross-sectional study by Karadag *et al.* among 1030 patients in Turkey observed that 68.64% regularly examined their

feet. This difference might be due to a difference in sample size, geographical region or gender differences. But in the study by Shrivastava *et al.* observed similar findings, they observed that 82.5% didn't examine their feet. This similarity might be due to studies being conducted in the same geographical region and similar socio-cultural practises [13-14].

The study by Vighnesh *et al.* [15] found that 80% of their study population didn't have an adequate knowledge score on diabetic foot care practises. In a study by Saurabh *et al.* [16], among 103 patients on the effectiveness of foot care education found that 34.5% had adequate knowledge score and the study by Cecyli *et al.* [17] in a hospital based study among 100 diabetic patients in Chennai found only 11% had adequate knowledge on diabetes foot self-care and the study by Subhashini *et al.* [12] found that 64.5% were unaware of foot self-care practises in general. In a hospital based study by Fatima *et al.* [18] among 358 patients in Pakistan observed that only 7% had good foot care knowledge. Our study shows that 60% of the

study population had high knowledge score. This difference might be due to a difference in population, geographical region or gender. But in a study conducted by Darshan *et al.* [19] among 133 subjects in a coastal South Indian hospital found that 75.2% had adequate knowledge. This finding was similar to our results.

Regarding the trimming of toe nails, our study found that only 5.5% correctly mentioned that it should be straight across. But in a study conducted by Desalu *et al.* in multi-centric cross-sectional study of Nigeria found that 33.5% trimmed their nails properly. And similar results in the study by Giriappa *et al.* among 101 diabetic patients of Bengaluru found 31% cut their nails straight. This vast difference might be due to differences in educational status, geographical region or different socio-cultural practises [20-21].

In terms of walking barefoot outside house, 87.3% believed that a diabetic patient should not go outside barefoot, while 96.4% walked outdoor barefoot frequently. Somewhat similar findings were observed in the study by Karadag *et al.* where they found that 70.97% walked barefoot outdoors. Our study observed that all the study participants changed their footwear when damaged, almost similar finding was observed in the study by Saurabh *et al.*, where 84.5% changed their footwear when damaged or ill-fitted [13,16]. The study by Shrivastava *et al.* observed that only 17.5% practised self-foot care practises and our study showed that around 91.8% were at a moderate level (satisfactory) of foot self-care practises. In a cross-sectional study conducted by Verma *et al.* among 416 diabetes mellitus patients in rural Haryana found that the practise score was satisfactory for 32.7% of their study population. This similarity might be due to gender difference

our study being conducted among exclusively women population [14,22].

Our study showed that age, family type and marital status were all significantly associated with level of knowledge and practise score and educational status and occupation were significantly associated with level of knowledge alone. Similar findings were found in the study by Vighnesh *et al.* who found that there was a statistically significant difference between age and the foot care practises and the study by Cecyli *et al.* found that age, occupation, educational status, duration of diabetes, gender, presence of co-morbid conditions and current treatment were significantly associated with diabetes self-foot care knowledge and practise [15, 17]. Our study found that level of knowledge and practise score are positively correlated with r of 0.202. A similar result was observed in the study by Vighnesh *et al.* on foot care practises among 60 diabetes mellitus in Puducherry which found a positive correlation between level of knowledge and practise ($r = 0.7$) [15].

To summarize, the study to assess the knowledge and practise of foot self-care among diabetic women residing in Thiruporur, Chengelpet district observed that the participants were partly aware of the foot care practises and partly not aware of a few foot care practises like keeping the area between toes dry, effect of moisturiser between toes and at the same time they were not practising what they correctly knew.

Conclusion

This study concluded that even though there was good knowledge of diabetes observed among the study participants, they were lagging behind in foot self-care practises. The current study concludes that adequate knowledge should be

imparted by the responsible physician in a structured manner using multiple methods frequently to have an effective impact on the patients, thereby preventing and managing foot-related morbidity effectively.

Recommendations

The observations from the current study imply the need for more qualitative research studies to identify the reasons behind the negative foot

practises among the study population. Strong policies and programmes at the local level to implement the health education programme effectively.

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