Original Research Paper

Volume-9 | Issue-7 | July - 2019 | PRINT ISSN No. 2249 - 555X

Health Science

KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS SELF-FOOT CARE MANAGEMENT IN PATIENTS WITH TYPE 2 DIABETES MELLITUS: AN INSTITUTIONAL BASED CROSS-SECTIONAL DESCRIPTIVE STUDY

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ABSTRACT

Introduction: We aimed to enumerate the knowledge, attitude and practice to self-foot care management in Type 2 Diabetes Mellitus (T2DM) patients.

Methodology: A cross-sectional study of successive type 2 diabetes patients attending routine out-patient diabetes clinics in tertiary care hospitals in Kolkata, India from 1stJune 2018 to 31st October 2018. All patients who matched our study eligibility criteria were interviewed by diabetes care providers using a structured questionnaire modeled after a systematic review of similar studies but tuned to regional preferences.

Results: The mean knowledge score of self-foot care management was 5.31 ± 1.65. The range of the minimum and maximum of the knowledge score obtained by the participants in this study was 2 and 9 respectively out of maximum possible total score of 11. On the basis of classifying the knowledge score obtained by the study participants, 292 (58.4%) were found to have good knowledge with regards to the diabetic foot care and the remaining 208 (41.6%) were found to have poor knowledge of diabetic foot care. The sub-group analysis to observe the trend between the male and the female participants with regards to foot examination revealed a higher proportion of females not checking their feet as compared to their male counterparts.

Conclusion: Knowledge and practice of foot care were grossly under practice for diabetes self-care management. Structured foot care educational program must be incorporated in routine clinical practice to overcome these deficiencies.

KEYWORDS : Diabetes Mellitus, Knowledge, Attitude, Practice, Self-foot care, India

INTRODUCTION:

The vast majority of people with diabetes, around 80 %, live in 'developing' countries, and it is in these countries that the largest increases in the burden of diabetes will occur over the coming decades.[1] Diabetic foot problems are a major cause of morbidity and premature mortality in people with diabetes and contribute substantially to the health care costs associated with diabetes.[2-4] Interventions to reduce the burden of diabetic foot ulceration and amputation are estimated to be highly cost-effective, indeed cost saving, in both developed and developing country settings.[5,6] The challenge, particularly in less well-resourced health care systems, is how to implement effective foot care that realizes these potential health gains and cost savings.[7-10]

Studies aimed at finding these knowledge, attitude and practice to self-foot care management are scarce, especially in the Asian subcontinent. Moreover, most of the available studies have targeted a small population of patient with DM. With that in mind, this study was devised with a goal to describe the possible knowledge, attitude and practice to self-foot care management, in an Indian context.

OBJECTIVES:

To enumerate the possible knowledge, attitude and practice to self-foot care management in Type 2 Diabetes Mellitus (T2DM) patients.

RESEARCH DESIGN & METHODOLOGY:

All patients attending the Diabetes clinic in tertiary care hospital in Kolkata, India during the time1stJune,2018 to 31stOctober 2018 were approached. Exclusion criteria included:

(I) Refusal to provide written informed consent
(ii) Pre-existing physical disability requiring long-term support
(iii) Type 1 Diabetes Mellitus
(iv) Pregnancy
(v) Patients below age of eighteen
(vi) Recent hospital admission for any cause within the last 6 months
(vii) Any documented psychiatric illness likely to impair judgment

Consecutive patients attending diabetes clinic in the hospitals were approached and briefed about the study. Following written informed consent, willing candidates fulfilling our criteria were interviewed by diabetes care providers using a structured questionnaire available in English, Bengali and Hindi. The questionnaire for assessment of knowledge of foot care was devised from but not limited to a systematic review of similar studies(6) tailoring it to circumstances relevant to our regional population. Validated Nottingham Assessment of Functional Footcare (NAFF) was used to appraise the functional foot care assessment among our study participants.

The questionnaire also included demographic details, patient particulars (BMI, duration of T2DM, Insulin or anti-hypertensive use) and recent laboratory investigations (HbA1c, Fasting and Postprandial glucose levels).

STATISTICAL METHODS:

Descriptive statistical analysis has been carried out in the present study. Significance is assessed at a level of 5%. Results on continuous measurements are presented as Mean ± SEM and results on categorical measurements are presented in Number (%). Significance is assessed at a level of 5%.

The following assumptions were made of the data: 1) Cases of the samples should be independent, 2) The populations from which the samples are drawn have the same variance (or standard deviation) and 3) The samples are drawn from different populations are random.Normality of data was tested by Anderson Darling test, Shapiro-Wilk, Kolmogorov-Smirnoff test and visually by QQ plot.

Statistical software:

The Statistical software namely SAS (Statistical Analysis System) version 9.2 for windows, SAS Institute Inc. Cary, NC, USA and Statistical Package for Social Sciences (SPSS Complex Samples) Version 21.0 for windows, SPSS, Inc., Chicago, IL, USA were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs and tables.

RESULTS:

A total of 500 patients were included in our study. The demographic and clinical variables of the patients are shown in Table1.

Table1: Study sample characteristics, N=500

Clinical Profile Variables	
Age, Mean ± SD	49.39 ± 11.49
BMI, Mean ± SD	23.81 ± 3.31
Hip Circumference, Mean ± SD	90.53 ± 6.93
Waist Circumference, Mean ± SD	89.71 ± 7.63

Waist Hip Ratio, Mean ± SD	0.99 ± 0.08
WHR - No Risk (Male<0.95,Female<0.85)	40.12%
WHR - Risk (Male ≥ 0.95,Female ≥ 0.85)	59.88%
Neck Circumference, Mean ± SD	34.19 ± 2.59
Duration of Diabetes, Mean ± SD	8.68 ± 6.52
Duration of Diabetes < 1 year	34 (6.8%)
Duration of Diabetes 1- 5 year	160 (32%)
Duration of Diabetes 5 - 10 year	148 (29.6%)
Duration of Diabetes > 10 year	158 (31.6%)
Hypertension, %	190 (38%)
Smoking, %	160 (32%)
Ex-smoker, %	82 (16.4%)
Alcoholic, %	44 (8.8%)
Ex-Alcoholic, %	100 (20%)
Anti-diabetic Drug Intake-Insulin & Orals, %	128 (25.6%)
Anti-diabetic Drug Intake-Oral agents, %	372 (74.4%)
Married, %	388 (77.6%)
Family History of Diabetes, %	322 (64.4%)

Knowledge of Study Participants towards Principles of Diabetic Foot Care:

The mean knowledge score was 5.31 ± 1.65. The range of the minimum and maximum of the knowledge score obtained by the participants in this study was 2 and 9 respectively out of maximum possible total score of 11. On the basis of classifying the knowledge score obtained by the study participants, 292 (58.4%) were found to have good knowledge with regards to the diabetic foot care and the remaining 208 (41.6%) were found to have poor knowledge of diabetic foot care.

Table 2: Knowledge of Study Participants towards Principles of Diabetic Foot Care:

		Number of subjects	Percent
DM patients should administer their medication regularly because they are prone to get DM complication	**Know**	262	52.4
	Don't Know	238	47.6
	Total	500	100.0

Two hundred sixty-two patients (52.4%) were found to be aware that DM patients should administer their medication regularly in order to avoid macrovascular and microvascular complications of diabetes. The remaining 238 (47.6%) of the patients said that they don't know if taking medications regularly can help them to prevent complications of diabetes, all these patients thought that these medications mainly work by reducing blood glucose levels and has no role in preventing complications. On further exploratory research, it was found that these patients have never received any form of diabetes care education by doctors, paramedical staffs or any pharmaceutical companies. This is the only differential factor which has led to the difference in understanding between the two groups. Hence, we can conclude that diabetes education is an essential factor in the overall management of diabetes.

Table 3: Regular checking of feet after minor injury

		Number of subjects	Percent
DM patients should regularly have a look at their feet because they may not feel a inor injury to their feet	**Know**	266	53.2
	Don't Know	234	46.8
	Total	500	100.0

On the other hand, only 266 (53.2%) of participants were having knowledge that diabetes patients should regularly check their feet because of the fact that they may not feel any minor injury due to underlying diabetic neuropathy.

Table 4: Time to heal after infection

		Number of subjects	Percent
DM patients should carefully inspect their feet because wounds and infection may take a long time to heal	**Know**	250	50.0
	Don't Know	250	50.0
	Total	500	100.0

Likewise, only 50% of the diabetes patients know how to carefully monitor and inspect their feet because of the fact that any wounds and infections usually take a long time to heal. If is neglected, it may lead to further soft tissue infection or ulcers. Thus, there is a equipoise in our study population with regards to the inspection and monitoring of feet, but it is far lower as compared to the developed countries where the percentage exceeds greater than 80%. Thus, there is a considerable need to update our diabetic population regarding the proper inspection and examination of foot.

Table 5: Inspection after foot ulcer

		Number of subjects	Percent
DM patients should properly inspect their feet because they are prone to get foot ulcer	**Know**	222	44.4
	Don't Know	278	55.6
	Total	500	100.0

Only 44.4% of the study respondents were aware of the fact that patients with diabetes mellitus should have a look at their feet regularly because they are more prone to develop foot ulcer as compared to the general population. When we conducted an exploratory analysis in the population who were not aware of the improper foot care which can lead to ulceration of the foot and tried to find out the reason, most of the participants reported that they have never heard about it from their doctors, paramedical staff or any other sources. Some of the patients even found it very hard to believe us that diabetic patients' foot are prone to ulceration. This apathy towards feet is very common in this part of the country and has to be improved to a great extent.

Table 6: Knowledge About Smoking Causing Complication

		Number of subjects	Percent
DM patients should not smoke because smoking results in poor circulation and impacts the feet	**Know**	250	50.0
	Don't Know	250	50.0
	Total	500	100.0

One hundred twenty-five (50%) of DM patients were not aware of the fact that smoking leads to poor circulation in the feet and likewise the remaining half (50%) of the study respondents were only aware of the fact that smoking may cause any damage to the foot. On further exploratory and case-based analysis, we surprisingly found that those who are aware of the fact that smoking is responsible for poor circulation and results in complications of the feet are also addicted to smoking. Most of the people who were aware are literate in contrary to those who were not aware. It was seen that those who were not aware were smoking to a greater extent than the aware population but as already mentioned even the patients who were made aware by their treating clinician were also involved in smoking to some extent.

Table 7: Knowledge about inspection of feet

		Number of subjects	Percent
Do you know how to inspect your feet?	**Know**	266	53.2
	Don't Know	334	46.8
	Total	500	100.0

Only, a meager proportion of the study subjects (53.2%) really do know how to inspect their feet. On further inquiry, the diabetes patients revealed that they have never received any formal or informal foot care education from their treating physician or paramedical staff. Even the 266 knowledge levels of the patients who have admitted knowing the procedure of inspecting the feet are not up to the mark and they were found not to be fully aware of the different aspects of proper foot care of diabetes. Hence, although it seems that a substantial number of patients do know how to take care of their feet, but it is not so. This finding of poor knowledge level was further confirmed by Nottingham functional foot care assessment questionnaire.

Table 8 Knowledge about redness between toes

		Number of subjects	Percent
What is the first thing you should do if you find redness or bleeding in between your toes?	**Know**	262	52.4
	Don't Know	238	47.6
	Total	500	100.0

It is highly alarming that around 52.4% of our study subjects were not having any clue regarding what to do in case there is any redness of the skin or bleeding in between the toes of the patients. This is primarily due to the fact that these patients were not properly trained how to the

take care in such scenarios. Most of these patients grossly lack the diabetes self- foot care management strategies. It also gives rise to an impending need of empowering our patients in various aspects of diabetes self-foot care management.

Table 9: Knowledge about washing of feet

		Number of subjects	Percent
Do you think you know how often you should wash your feet?	**Know**	258	51.6
	Don't Know	242	48.4
	Total	500	100.0

With regards to the maintenance of general foot care hygiene, more than half of the patients (51.6%) were not aware how frequently they should wash their foot in order to prevent further foot related complications.

Table 10: Knowledge about temperature of water for washing feet

		Number of subjects	Percent
Do you think you know what temperature of water you should wash your feet in?	**Know**	50	10.0
	Don't Know	450	90.0
	Total	500	100.0

It is highly alarming that a substantial proportion of 90% of the study respondents were not aware of the temperature at which they should wash their feet. Only 10% admitted that they know the proper temperature which is ideal for washing their feet.

Table 11: Knowledge about inspection of inside footwear

		Number of subjects	Percent
Do you know how frequently you should inspect the inside of your footwear for torn lining or any objects?	**Know**	284	56.8
	Don't Know	216	43.2
	Total	500	100.0

A total of 56.8% of the study participants were not having knowledge with regards to the ideal frequency at which they should inspect the inside of their footwear to check if its torn from inside out or are there any objects inside the footwear which may damage the feet on wearing.

Table 12: Knowledge about wearing shoes and socks

		Number of subjects	Percent
How often do you think you know should wear shoes and socks?	**Know**	254	50.8
	Don't Know	246	49.2
	Total	500	100.0

Likewise, as expected more than half (50.8%) don't have any idea how often they should wear their shoes and socks as per the standards of diabetes foot care. This is in line with our previous findings as observed in the Nottingham functional foot care assessment questionnaire. When asked why they were not aware of such findings, most of the participants reported that they never received any functional foot care knowledge education or any self-foot care management training.

Attitude and Practice regarding self-foot care management:

- Foots should be examined on regular basis, however one-fourth of our study participants never examined their foot. Higher number of female diabetic patients checking their feet more frequently than the male diabetic patients.
- Shoes should be checked regularly after taking off, however the practice of checking shoes after taking it off was found not to be performed at all by 24% of the study population. No difference was found between males and females.
- The habit of checking shoes before wearing is being practiced by around only one-fourth of the study population which is grossly deficient by the current standards. No difference was found between males and females.
- 156 (31.2%) never checked for drying of feet after washing. No difference was found between males and females.
- Toes should always be dried, however 166 (33.2%) never dried their toes after washing the feet which may lead to further infections.
- The proportion of patients who practiced of never drying their toes were higher in males by 18 percentage points than our female participants.
- It is highly disappointed to note that 152 subjects (30.4%) of the total study population have never washed their feet. No significant difference was found between the female and the male diabetic patients.
- Creams should be applied on feet regularly, however only 148 (29.6%) of the total population never ever use cream on their feet. The gender sub-group analysis revealed that the usage of the cream on the feet. Not surprisingly, the usage of the cream was significantly higher in the female participants.
- Around 21.6% (n=108) of the total study participants have been found to check for their toe-nails cut on rare basis. No significant difference was found between the female and the male diabetic patients.
- Less than one-fourth of study participants have been to use the sandal on regular basis whereas around 27.2% (n=136) never use sandals. No significant difference was found between the female and the male diabetic patients.
- Around one-fifth (20.2%) of the study subjects never wore pointed-toed shoes. The remaining 80% wear it which is not advised at all.
- Around one-fifth (20.4%) of the study subjects never wear nylon socks. The remaining 79.6% wear it which is not advised at all.
- A total of 110 (22%) study participants have reported to never wear socks which increases the chances of foot injury.
- Around one-fourth of the study participants (24.4%) walk around the house in bare foot increasing the chances of foot complications.
- 120 participants (24%) have been using the hot water in the bed sometimes which may increase the risk of burn related injury.
- During winters, around one-third of the study participants have somewhat indulged in warming feet near fire place.

DISCUSSION:

Although studies highlighting knowledge, attitude and practice to self-foot care management in T2DM come up from time to time, to our knowledge this is one of the largest studies addressing the same with regards to self-foot care management in T2DM patients.

Foot conditions are highly prevalent amongst diabetic patients. Globally the lifetime risk of a diabetic patient developing a foot ulcer is 15%. They potentially result in decreased function and quality of life for patients. They result in either loss of limb and loss of life and diabetes is by far the leading cause of amputation in the developed world. Such negative outcomes are preventable. To a large extent, these negative outcomes occur due to late diagnosis and improper diabetic foot care.

The functional foot care assessment was performed by administering the Nottingham assessment of functional foot care measure. Now, this is a very risky phenomenon as patients with diabetes mellitus often cannot feel the pain and injury of the insensate feet which can further lead to many foot related complications. Around 30% of the study participants have not been able to perform examination of foot.

The sub-group analysis to observe the trend between the male and the female participants with regards to foot examination revealed a higher proportion of females not checking their feet as compared to their male counterparts. Various reasons have been cited by the female participants, one of which is the priority to take care of the other family member's needs due to which their own foot care takes a back seat.

The regular practice of checking the shoes before wearing and after taking the shoes off is recommended by all international clinical practice guidelines including the international diabetes federation. Both of these habits are grossly under performed by both the male and the female participants in our study. The present study thus demonstrated that the knowledge and foot care practice are considerably poor. Similar results were reported by Pitchai et al. who had carried out a study to assess the same in Navi Mumbai, India. Although, we have not made any separate comparison of urban and rural habitat, but we included equal proportion of patients from both the habitats to get a fair idea of the entire population. Earlier Kide et al. had correctly demonstrated that the patients belonging to the rural area have very poor knowledge, attitude and practice. As a result of which, they become much more prone to foot related complications. On further extrapolating as if why the rural population are more vulnerable to develop such complications, we found the following findings. First,

the diabetics from rural area are not checking their shoes both before as well as after wearing it. Secondly, they also do not pay attention to the development of new cuts or sores in their feet which further progresses to advanced stage. Third, the prevalence of tobacco usage, smoking as well as alcohol consumption is on the higher side which might predispose these individuals to greater foot problems. Fourth, the awareness of checking the water for correct temperature is very poor coupled with exposing to feet to warm fire place during winters are also on the higher side. India being a country where 70% of the population still resides in rural areas, special attention must be paid to the above-mentioned factors for keeping a check on the incidence of diabetic foot problems. Other developing countries from South-east Asia and Middle-East also reported poor foot care knowledge. Most of the patients from the rural area belong to low socio-economic strata and had very limited access to health care in their respective areas. All the patients reported that they became aware of the foot care problem only after they were referred to our center for a comprehensive diabetic check-up. It has also been observed that in rural India, barefoot walking is a common practice due to which there are elevated risk of foot related injuries. Additionally, the footwears used by most of the rural population are also not appropriate for diabetics. The selection of footwear from a podiatrist's perspective is very poor in rural diabetic patients. Inappropriate foot wear greatly increases the pressure per unit area on the plantar surface, thereby increasing the risk of foot ulcers and subsequent amputations. Also, they are more tolerant to corns, cuts, burns and blisters and very often neglect the warning signs of injury.

There are many other external factors for heightened foot injury in the rural population due to bad condition of the roads, more stones and pebbles lying on the road etc. We didn't find any variation between the knowledge level of both male and the female rural patients with no difference between both the gender, p=0.822 as computed by chi-square test. We also observed more intensive and elaborate foot care education are required for the patients of rural areas as they are not aware of any of its components beforehand. On the contrary, the patients from the urban areas have more or less fair amount of background knowledge due to which it is easier to build and develop the concepts in these patients. Previous studies have demonstrated the variability in the background knowledge to be ranging somewhere between 18% and 52.4%. This reflects the inconsistency in the level of knowledge amongst the rural population and the need of utmost caution in assessing the baseline knowledge level in these patients.

Proper washing of foot is an integral part of all the diabetes foot care guidelines. It is recommended by all guidelines to wash the feet in lukewarm water. The bathing of the feet must be gentle with usage of a mild shop. The bathing has to be performed on daily basis. Since there is neuropathy in the peripheral limbs particularly in the foot as well as fingers, it is strictly prohibited to dip the foot directly into the water without measuring the temperature of the water. It can lead to burning of the feet without any reflex action of removing the feet due to sensory as well as motor neuropathy. It is strongly advocated to measure the temperature of the water with thermometer or with the help of other family members. If both thermometer and other family member's help are not available, one should measure the temperature with the help of elbow by dipping it into water since neuropathy is not affecting the nerves in the elbow region.

Drying between toes is another important aspect of proper foot care hygiene. As India is a tropical country with around rainy season being for around five to six months, hence it becomes essential to keep the area between the toes properly dried up, especially in the rainy weather. For areas like Kolkata and its surrounding, the humidity is one of the culprits playing the spoil sport, especially in aggravating water-borne fungal infections in the areas between the toes. It is recommended not only to keep the area between the fingers dried up properly but also to apply antiseptic and disinfectant powders to keep away any type of infections. Since, it is recommended to regularly wash the feet it is also necessary to educate the patients to dry the toes properly after washing. Similar to the previous paragraph which accounted for the apathy towards foot injuries, the drying of toes was also paid least attention by the diabetics in the rural areas.

CONCLUSION:

Knowledge and practice of foot care were grossly under practice for diabetes self-care management. Structured foot care educational program must be incorporated in routine clinical practice to overcome these deficiencies.

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