Original Article

Knowledge, Attitudes and Foot Care Practices Among Patients with Diabetic Foot Infection Attending a Rural Tertiary Care Hospital in Kerala: An Analytical Cross-Sectional Study

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Abstract

Background: Diabetic foot infection (DFI) is a common and serious complication of diabetes mellitus and is a leading cause of hospitalisation, disability, and lower limb amputation. Knowledge, attitude, and practice (KAP) regarding foot care play a crucial role in preventing diabetic foot complications. The aim is to assess the knowledge, attitudes, and practices regarding diabetic foot infection and identify factors associated with poor foot care practices among patients attending a rural tertiary care hospital in Kerala.**Material and Methods:** An analytical cross-sectional study was conducted among 100 patients with diabetic foot infection. Data were collected using a validated, semi-structured questionnaire that assessed socio-demographic characteristics and KAP regarding diabetic foot care. Composite KAP scores were calculated. The participants who scored less than 50% of the total knowledge score were considered to have poor knowledge, whereas those who scored 50% or more were considered to have good knowledge. The chi-square test and binary logistic regression were performed with SPSS. p-value <0.05 was considered statistically significant.**Results:** Among the participants, 69.0% were males and 56.0% were aged above 60 years. Diabetic foot ulcer was present in 42.0% of patients, and the duration of diabetes was more than 30 years in 21.0%. Regarding knowledge and attitudes, 57.0% of respondents believed that diabetic foot ulcers are not preventable, 50.0% were unaware of the need for protective footwear, and 87.0% acknowledged the importance of physical activity. Poor foot care practices were incorrect toenail trimming (82.0%), dry dressings (81.0%), not drying the feet after washing (75.0%), wearing unfastened slippers (70.0%) and not inspecting feet regularly (67.0%). Poor foot care practices were significantly associated with deficient knowledge (p=0.003). Multivariate analysis identified deficient knowledge as the only independent predictor of poor practices (AOR = 2.30; 95% CI: 1.20–4.40; p = 0.012). **Conclusion:** Deficient knowledge significantly contributes to poor foot care practices among patients with diabetic foot infection. Targeted educational and behavioural interventions are essential for improving foot care practices and reducing diabetic foot complications.

Keywords: Diabetic Foot Infection; Diabetes Mellitus; Knowledge; Attitude; Practice; Foot Care; Rural Population; Kerala; Diabetic Foot Ulcer; Health Education.

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Introduction

Diabetes mellitus (DM) is one of the major public health problems around the world that is seeing exponential growth particularly in developing nations like India. To date, India is estimated to be one of the most populous countries with diabetes and it is described as the "diabetes capital of the world",[1] a description that merely reflects the fact that India is expected to see a significant surge in the number of people with diabetes. Diabetes and its effects is a chronic condition that demands a significant investment from patients and various players along the continuum of healthcare. Among the myriad complications of diabetes, DFI is one of the most expensive and devastating conditions. It frequently results in prolonged hospitalisation, disability, and amputation of the lower extremity.[2]

DFI is defined as infection in any tissue below the malleoli in a person with diabetes and is most often associated with foot ulcers. The three-fold combination of peripheral neuropathy, peripheral arterial disease and impaired wound healing increases the risk of foot ulceration and subsequent infection in diabetic individuals.[3] In the world, an estimated 15–25% of patients with diabetes will develop a foot ulcer at some point in their lives, and a considerable proportion of these ulcers become infected.[4] Diabetic foot complications cause major morbidity and are among the leading causes of non-traumatic lower extremity amputation worldwide.[5]

Diabetic foot disease is an enduring burden that is worsening as diabetes prevalence continues to rise in India. Foot care in India is compromised by delayed health-seeking behaviours, limited knowledge of foot care, and a lack of resources for specialised diabetic care, especially in rural areas.[6] Rural populations are often faced with additional challenges, including lower literacy,

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socio-economic factors, limited access to health care and limited exposure to diabetes education programmes. These factors are associated with poor knowledge and practice of self-care, predisposing to foot complications and poor prognosis.[7]

The knowledge, attitudes, and practices (KAP) model can be used in the context of diabetic foot disease to recognise the importance of diabetic foot care and foot care practices. Knowledge here means understanding about the disease, its risk factors and prevention. Attitude is the belief or willingness of the person to take up preventive behaviours and practice is the actual behavior of foot care in real life.[8] It has been shown in several studies that patients who have adequate knowledge and positive attitude perform better foot care practices, resulting in decreased amputation risk, infection and ulceration.[9] Conversely, it is those who do not understand proper diabetic foot care and who hold misconceptions who tend to have poor treatment outcomes and more delayed foot problem detection.

The assessment of the KAP for those having diabetic foot infection provides valuable information about prevailing awareness and behaviour gaps which could be a factor in disease progression. This information can prove useful to a person's education and the community's care for self and prevention of complications. Although Kerala's health outcomes are relatively favourable when compared with other states of India, there are still issues with diabetes control and foot care among the rural population.

Therefore, the present study was conducted to estimate diabetic foot infection knowledge, attitude and practices in outpatient department of a government tertiary care hospital at Pottuvil (Sayuvil) in Aluva, Kerala and to identify the factors associated with the poor foot care practices among the patients visited the OPD of diabetic patient of the OUH at Pottuvil (sayuvil) village in Aluva, Kerala. The results might help healthcare providers and policymakers design efficient interventions for lowering the incidence of diabetic foot complications among patients and enhance the outcomes for the patients.[10]

To evaluate baseline knowledge and attitude of patients regarding DFI, analyze their practices and behaviors concerning prevention and management of DFI and suggest accordingly the targeted interventions to improve the efforts of patients to prevent and manage DFI.

Materials and Methods

Study Design: Hospital-based analytical cross-sectional study.

Study Population: Patients diagnosed with diabetic foot infection (DFI) attending the General Surgery Department of a rural tertiary care hospital in Kerala.

Sample Size: A total of 100 patients with diabetic foot infection were included in the study.

Study Duration: 1 year.

Study Site Department of General Surgery, Rural Tertiary Care Hospital, Kerala,

Inclusion Criteria:

- Patients ≥ 18 yea
- Diagnosed cases of diabetic foot infection.
- Patients willing to provide informed written consent.
- Patients attending inpatient or outpatient services during the study period.

Exclusion Criteria:

- Critically ill patients who could not participate in the interview.
- Patients with cognitive impairment, psychiatric illness or communication difficulties that would influence their ability to complete the questionnaire.
- Patients unwilling to participate in the study.
- Patients with non-diabetic foot ulcers or infections.

Knowledge Assessment: Diabetic foot care questionnaire answered were used to determine Knowledge and Attitude scores. One mark was awarded for every correct answer and zero marks for incorrect answers. Those with a score less than 50% of possible points were considered to have deficient knowledge, whereas those who scored 50% or more were considered to have adequate knowledge.

Statistical Analysis: The data was inputted into Microsoft Excel and analysed using SPSS version 29.0 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as frequencies and percentage. The Chi-square test or Fisher's exact test was used for categorical variables to show associations between them as appropriate. Variables showing clinical relevance were entered into a binary logistic regression model to determine independent factors relating to poor foot care practices. Adjusted odds ratios (AORs) and 95% confidence intervals (CIs) were presented. A p value< 0.05 was deemed statistically significant.

Results

Table 1: Socio-Demographic Characteristics and Clinical Profile of Study Participants

Characteristic	Frequency (n)	Percentage (%)
Male Gender	69	69
Female Gender	31	31
Age > 60 Years	56	56
Age ≤ 60 Years	44	44
Unemployed Males (n=69)	21	30.4
Homemaker Females (n=31)	28	90.3
Presence of Diabetic Foot Ulcer	42	42
Absence of Diabetic Foot Ulcer	58	58
Duration of Diabetes > 30 Years	21	21
Duration of Diabetes ≤ 30 Years	79	79

Table 2: Knowledge and Attitude Regarding Diabetic Foot Care Among Study Participants

Knowledge and Attitude Variable	Frequency (n)	Percentage (%)
Unhealthy Diet Practice	60	60
Recognise Need for Dietary Changes	69	69
Do Not Exercise Regularly	87	87
Acknowledge Importance of Physical Activity	87	87
Believe Ulcers Do Not Affect Social Life	54	54
Believe Foot Ulcers Are Not Preventable	57	57
Unaware of Need for Protective Footwear	50	50

Table 3: Foot Care Practices Among Study Participants

Foot Care Practice	Frequency (n)	Percentage (%)
Walk Barefoot Outdoors	15	15
Walk Barefoot Indoors	25	25
Use Dry Dressings for Wounds	81	81
Incorrect Toenail Trimming	82	82
Do Not Dry Feet Thoroughly After Washing	75	75
Do Not Wash Feet Daily	30	30
Do Not Inspect Feet Regularly	67	67
Prefer Unfastened Slippers	70	70

Table 4: Association Between Knowledge Level and Foot Care Practices Among Study Participants

Knowledge Level	Poor Foot Care Practices n (%)	Good Foot Care Practices n (%)	Total	p-value
Deficient Knowledge (n=58)	45 (77.6)	13 (22.4)	58	0.003
Adequate Knowledge (n=42)	20 (47.6)	22 (52.4)	42	
Total	65 (65.0)	35 (35.0)	100	

Table 5: Binary Logistic Regression Analysis of Factors Associated with Poor Foot Care Practices

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Deficient Knowledge	2.3	1.20 – 4.40	0.012
Age > 60 Years	1.42	0.73 – 2.78	0.301
Male Gender	1.18	0.59 – 2.36	0.641
Duration of Diabetes > 30 Years	1.67	0.81 – 3.45	0.167
Presence of Foot Ulcer	1.54	0.79 – 3.02	0.203
Lower Socioeconomic Status	1.71	0.88 – 3.33	0.112

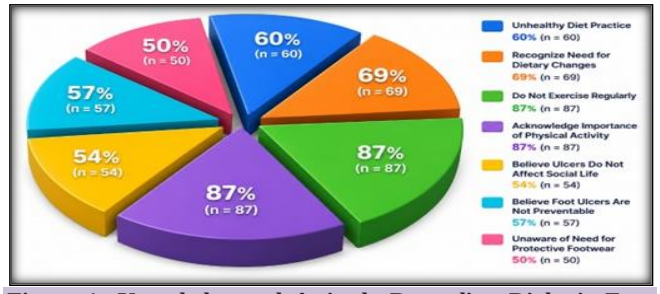

Figure 1: Knowledge and Attitude Regarding Diabetic Foot Care Among Study Participants

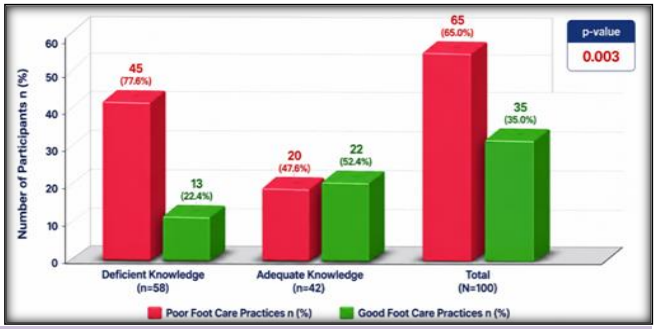

Figure 2: Association Between Knowledge Level and Foot Care Practices Among Study Participants

A total of 100 patients with diabetes mellitus were included in the study. Among the participants, 69 (69%) were males, and 31 (31%) were females. More than half of the study population, 56 (56%), were aged 60 years or older, while 44 (44%) were aged 60 years or younger. Among male participants, 21 (30.4%) were unemployed, whereas among female participants, 28 (90.3%) were homemakers. Diabetic foot ulcer was present in 42 (42%) participants, while 58 (58%) did not have a foot ulcer. Regarding disease duration, 21 (21%) participants had diabetes for more than 30 years, whereas 79 (79%) had diabetes for 30 years or less [Table 1].

Assessment of knowledge and attitudes related to diabetic foot care revealed several gaps. Sixty (60%) participants had unhealthy dietary practices, even though 69 (69%) were aware of the need for dietary modification in diabetes management. The large majority, 87 (87%), did not engage in regular physical exercise, but the same proportion recognised the importance of physical activity in maintaining good health. More than half of the participants, 54 (54%), thought that foot ulcers do not greatly affect social life, and 57 (57%) thought foot ulcers are non-preventable. Furthermore, 50 (50%) of the participants were unaware of the importance of wearing protective footwear to prevent foot-related complications [Table 2].

Evaluation of foot care practices showed some unfavourablebehaviour among study participants. Fifteen (15%) participants reported walking outside barefoot, while 25 (25%) reported walking inside barefoot. 81 (81%) participants used dry dressings to care for the wound.82 (82%) participants had improper toenail cutting habits, and 75 (75%) did not dry their feet properly after washing. Thirty (30%) participants reported not washing their feet daily, and 67 (67%) did not regularly

inspect their feet for signs of injury or infection. Most,70 (70%), chose unfastened slippers instead of protective footwear, which may lead to a higher risk of foot trauma and ulceration [Table 3]. Of the 58 participants with poor knowledge, 45 (77.6%) had poor foot care practices, while 13 (22.4%) had good foot care practices.The association between knowledge level and foot care practices was statistically significant ($\chi 2$ test, p=0.003), indicating that better knowledge was associated with better foot care behaviour[Table 4].

Binary logistic regression analysis was conducted to determine factors independently associated with poor foot care practices. Deficient knowledge emerged as a significant predictor, with participants having deficient knowledge demonstrating 2.3 times higher odds of poor foot care practices compared with those having adequate knowledge (AOR=2.3, 95% CI: 1.20–4.40, p=0.012). Although age greater than 60 years (AOR=1.42, 95% CI: 0.73–2.78, p=0.301), male gender (AOR=1.18, 95% CI: 0.59–2.36, p=0.641), duration of diabetes greater than 30 years (AOR=1.67, 95% CI: 0.81–3.45, p=0.167), presence of diabetic foot ulcer (AOR=1.54, 95% CI: 0.79–3.02, p=0.203), and lower socioeconomic status (AOR=1.71, 95% CI: 0.88–3.33, p=0.112) showed increased odds of poor foot care practices, none of these variables achieved statistical significance. These findings suggest that inadequate knowledge of diabetic foot care is the most important independent determinant of poor foot-care behaviour among diabetic patients in the present study [Table 5].

Discussion

The present study evaluated the knowledge, attitudes, and practices regarding diabetic foot infection among patients attending a rural tertiary care hospital in Kerala. The findings demonstrated that diabetic foot infection was predominantly observed among elderly male patients, with significant deficiencies in foot care knowledge and practices. Furthermore, deficient knowledge emerged as the only independent predictor of poor foot care behaviour.

In the present study, males constituted 69.0% of the study population, indicating a clear male predominance among patients with diabetic foot infection. Similar findings were reported by Kumar et al,[11] who found that about 72% of patients with diabetic foot were male. Similar results were reported by Mairghani et al,[12] who found that males accounted for more than two-thirds of diabetic foot ulcer cases. Men may be more likely to be active outdoors, to be exposed to trauma in their work and to be less inclined to seek care, which may explain this superiority. These results corroborate previous data showing that gender represents one of the main demographic features for people suffering from diabetic foot problems.

There were the age distribution analysis results of the present study which found that 56.0% were more than 60 years of age. Ravisharma and Vijayananda,[22] also reported that the mean age of patients with DF was above 60 years which is similar to the findings of Abbas et al.[13] Similar findings were reported by Al-Rubeaan et al,[14] that the prevalence of diabetic foot complications increased with the age of the patients. The increased susceptibility to diabetic foot infection is linked with ageing; specifically with longer duration of diabetes, peripheral vascular disease, neuropathy and diminished wound healing capacity. The current results then confirm the already known correlation between age and diabetic foot disease.

As for clinical features, 42.0% of the participants had DFU and 21.0% had a diabetes duration of more than 30 years. The same was obtained in findings by Yazdanpanah et al,[15] which concluded that the increase in the duration of diabetes was among the most appropriate risk factors for the development of diabetic foot ulcer. Nather et al,[16] also showed that neuropathy, ulceration and infection are much more likely in the long term diabetes. These findings illustrate the effects of a long history of hyperglycaemia on microvascular and neurological complications that increase the risk of foot complications in patients. Knowledge and attitude assessment pointed out gaps in the knowledge and attitude of the participants.

In the present study, 57.0% of participants believed that diabetic foot ulcers are not preventable, and 50.0% were unaware of the need for protective footwear.This discrepancy indicates a large knowledge–practice gap, suggesting that awareness may not translate into appropriate self-care behaviour. Similar observations have been reported in earlier studies emphasising the need for structured educational and behavioural interventions. Overall, knowledge of preventive foot care was poor, although many respondents were aware of some risk factors. Similar findings were also reported by George et al,[17] who concluded that diabetic patients in rural parts of South India had poor awareness of the prevention of diabetic foot. Likewise, Muhammad-Lutfi et al,[18] reported inadequate knowledge on foot care despite regular visits to health care providers. These deficiencies may be due to limited health education, lower literacy levels and insufficient counselling.

Assessment of foot care practices revealed poor compliance with recommended preventive practices.82.0% of participants reported incorrect toenail trimming, 75.0% did not dry their feet properly after washing, 67.0% did not inspect their feet regularly, and 70.0% preferred unfastened slippers. Hasnain and Sheikh,[19] also observed that many diabetic patients did not perform routine foot inspections and wore inappropriate footwear. Chiwanga and Njelekela,[20] also found poor foot hygiene and poor self-foot examination in diabetic patients. These findings indicate that awareness alone may not be sufficient to bring about behavioural change unless it is supported by structured education and regular follow-up.

In the present study, a significant association was found between knowledge level and foot care practices (p=0.003).Those with poor knowledge were significantly more likely to have poor foot care practices than those with adequate knowledge. These results were confirmed by multiple investigators who found that a higher level of knowledge was associated with increased knowledge about the importance of foot care and prompt treatment if something was amiss, and greater participation in prevention activities.[17,18] Association highlights the role of patient education in prevention of diabetic foot complications.

In addition, multivariate logistic regression analysis showed that poor foot care practices was only associated with lack of knowledge (AOR = 2.30; 95% CI = 1.20-4.40; p = 0.012). There were significant but non-statistically significant associations between increased odds of poor practices with older age, male gender, duration of diabetes and foot ulcer, and with lower socioeconomic status. George et al,[17] also reported a similar result whereby lack of knowledge remained the most important factor related to poor foot care behaviour after adjustment for other confounding factors. Hence, the current research emphasizes the knowledge gap as a modifiable risk factor, which can be overcome by deliberate measures of education intervention.

The overall results indicate that there is significant lack of actual foot care behaviour among the patients with DFI, although they are aware of these foot care issues and their associated complications. However, enhancement of patients' education, behavioural change communication and community-based diabetic foot care programmes may be useful in improving the preventive behaviours and lessen the burden of diabetic foot complications among the rural people.

Conclusion

The present study revealed a high level of knowledge, attitude and practice deficits in diabetic foot care in diabetic foot infection patients. More than half thought that DFUs were not preventable and half had no idea about the importance of protective footwear. Awareness of the importance of physical activity was high but uptake of healthy practices was low. The care of feet was poor, particularly with regard to inspecting, trimming, drying and dressing, which were very common. The statistical analysis showed that there was a significant correlation between having a lack of knowledge and foot care practices. Furthermore, the poor self-reported foot-care behaviour was independently associated with deficient knowledge in a multivariate analysis. The findings show that there is still a lack of understanding in the rural population about the preventive measures of diabetic foot complications, which remains one of the major challenges in achieving effective prevention of diabetic foot complications. Thus, proper education of patients, properly organised diabetic foot care counselling, community education and reinforcement of self-care practices for reducing DFPs, prevention of amputation and enhancement of quality of life should regularly be part of diabetes management.

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Conflicts of interest

There are no conflicts of interest.

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