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Knowledge Assessment of Diabetic Foot Ulcer Prevention Among Patients at A Tertiary Care Center in India

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Abstract

Objective: To assess knowledge and practices regarding diabetic foot ulcer prevention among diabetic patients attending a tertiary care hospital in northern India, and to identify factors associated with knowledge levels.

Methods: A descriptive cross-sectional study was conducted among 209 diabetic patients without current foot ulcers attending the outpatient department at Adesh Medical College and Hospital, Haryana. A systematic self-administered questionnaire measuring knowledge of diabetes, foot ulcer risk factors, and foot care behaviors was used to gather data; knowledge scores were classified as inadequate (less than 50%), average (between 50 and 75%), or adequate (more than 75%).

Results: The mean age of participants was 45.6±16.7 years with an distribution amongst male and females. Type 2 diabetes was predominant (83.4%). Despite 75% of participants demonstrating inadequate knowledge about diabetic foot care, approximately 63% practiced reasonable foot care. Most participants correctly knew that feet should be washed daily (79.5%) and with warm water (72.6%), but only 33.2% regularly inspected their feet. Patients receiving information from healthcare professionals demonstrated significantly better knowledge ($p<0.01$). Educational status, employment, and type of diabetes were significantly associated with knowledge levels.

Conclusion: Despite practicing reasonable foot care, diabetic patients demonstrated considerable knowledge deficits regarding foot ulcer prevention. Healthcare provider education plays a crucial role in improving knowledge. Structured educational interventions specifically targeting high-risk populations with low socioeconomic and educational backgrounds are necessary to prevent diabetic foot complications and subsequent amputations.

Keywords: Diabetes mellitus; Diabetic foot; Prevention; Knowledge; Practice; Patient education; India

INTRODUCTION

Diabetes Mellitus is a silent killer and one of the fastest-growing threats to public health worldwide. India has emerged as the "Diabetic capital of the world" with the highest diabetic population globally (101 million people)[1]. Approximately 3-4% of individuals with diabetes currently have foot ulcers or deep infections, and about 15% develop foot ulcers during their lifetime[2]. In Haryana, India, about 14.3% of residents have diabetes, with 10-12% developing foot problems annually. The treatment costs for each foot ulcer range from INR 30,000 to 200,000, with healing typically taking 4-6 weeks. Inadequately treated ulcers precede 85% of diabetic foot amputations[3].

Study Rationale

Diabetes represents the third leading cause of death by disease. Diabetic patients are susceptible to foot problems due to vasculopathy (blood vessel damage) and neuropathy (nerve damage), which decrease sensation in the feet, potentially allowing injuries to go unnoticed until severe infections develop[4]. Worldwide, a leg is lost due to diabetes every 30 seconds, with diabetic individuals being up to 40 times more likely to undergo lower leg amputation[5]. In developing countries like India, treating diabetic foot complications accounts for 40% of the allocated health budget[6].

With India's large diabetic population (11.4% of the country's total population), foot problems account for 40% of all diabetic hospital admissions[7]. These complications cause significant disability, suffering, work absences, and increased healthcare expenses through hospitalization[8,9]. The World Diabetes Day campaign in 2005 highlighted this issue with the theme "PUT FEET FIRST, PREVENT AMPUTATION," emphasizing the need for effective measures to disseminate knowledge about foot care and complication prevention.

Study Objectives

- To assess knowledge regarding diabetic ulcers and their prevention among the general population
- To identify relationships between this knowledge and selected demographic variables
- To develop a self-instructional module for diabetic foot ulcer prevention

Review of Literature

Previous studies have identified several risk factors for diabetic foot ulcers. Morbach et al.[10] compared patients with diabetic foot lesions from three regions (Germany, India, and Tanzania) and found that average diabetes duration until initial foot lesion was 14 years in Germany, 12 years in India, and 5 years in Tanzania, with corresponding mean patient ages of 71, 56, and 51 years. While neuropathy was common across all three regions, inadequate footwear was the primary cause of lesions in Germany (19%), whereas lack of footwear, irregular foot care, and burns were the main precipitating factors in Tanzania and India.

Regarding ulcer recurrence, research has shown that patients with foot ulcers have a high relapse risk, with 28-51% of diabetics who underwent amputation requiring a second amputation within five years[11]. Male patients showed a higher prevalence of relapse with a sex ratio of 3:2, and 71.5% had Type 2 diabetes, highlighting the importance of specialized management.

Studies on foot care interventions have demonstrated that therapeutic footwear significantly reduces foot pressure compared to non-therapeutic options (6.2-6.9 kPa vs. 40.7 kPa, $p<0.001$), with non-therapeutic footwear users experiencing significantly higher rates of new lesions (33% vs. 4%)[12]. Additionally, research by Oyibo et al.[13] found that 41% of patients with diabetic foot ulcers had peripheral vascular disease, 45% had neuropathy, and 16% had neuro-ischemic ulcers, with the latter associated with high morbidity and mortality.

Educational interventions are crucial, as demonstrated by Viswanathan et al.[9], who found that women with low educational status had more severe foot problems like gangrene. Furthermore, comprehensive foot care programs are necessary to prevent amputations, although Dargis et al.[14] found that peripheral vascular disease showed a stronger association with bilateral amputation than neuropathy or foot care knowledge levels.

Methodology

This descriptive survey was conducted in the surgical outpatient department of Adesh Medical College and Hospital in Mohri, Haryana, after obtaining ethics committee approval.

Target Population and Inclusion Criteria

- Diabetic patients attending outpatient services without current foot problems
- Patients of any gender with diabetes mellitus
- Patients willing to participate in the study

Exclusion Criteria

- Diabetic patients with current foot ulcers
- Patients recovered from diabetic foot ulcers
- Patients with mental disturbances, allergic history, or protracted illness

Research Instrument

A structured self-administered questionnaire was developed in English, Hindi, and Haryanvi languages. The questionnaire contained 35 questions divided into three sections:

- Section I: Demographic information (gender, age, marital status, income, education, occupation, family history, diabetes duration, previous education, type of diabetes, information sources)[15]
- Section II: Knowledge about general aspects of diabetes mellitus (causes, symptoms, diagnosis)
- Section III: Knowledge about risk factors for foot ulcers, foot hygiene, skin care, and exercise

Scoring Method

Knowledge was measured using multiple-choice questions with four options. Correct answers received one point, incorrect answers zero. Scores were interpreted as:

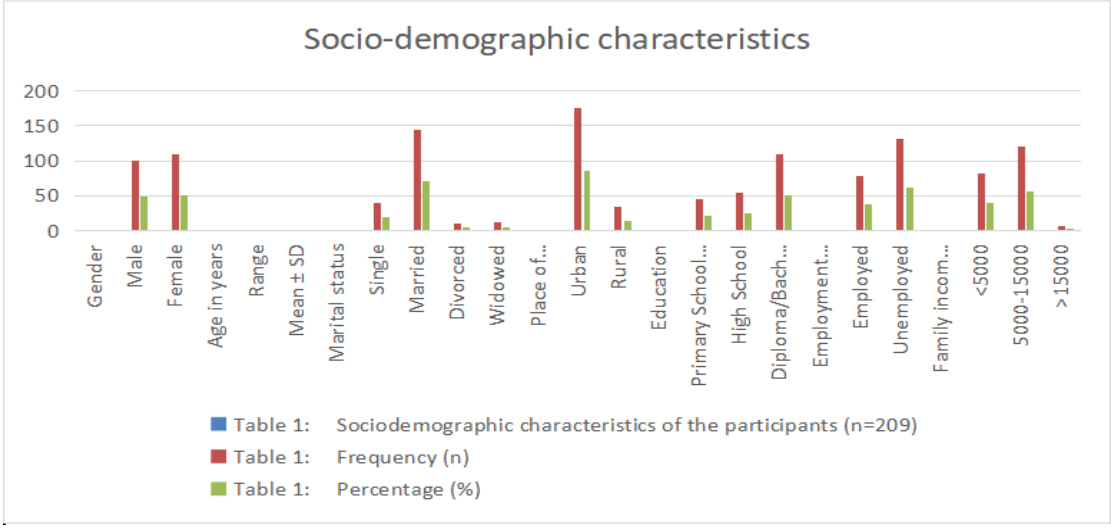
- Below 50%: Inadequate knowledge
- 50-75%: Average knowledge
- Above 75%: Adequate knowledge

A total of 209 patients were interviewed for data collection. Descriptive statistics (frequency, percentage, mean, standard deviation) were used to assess knowledge levels, while inferential statistics (chi-square test) identified associations between knowledge levels and demographic variables.

Results

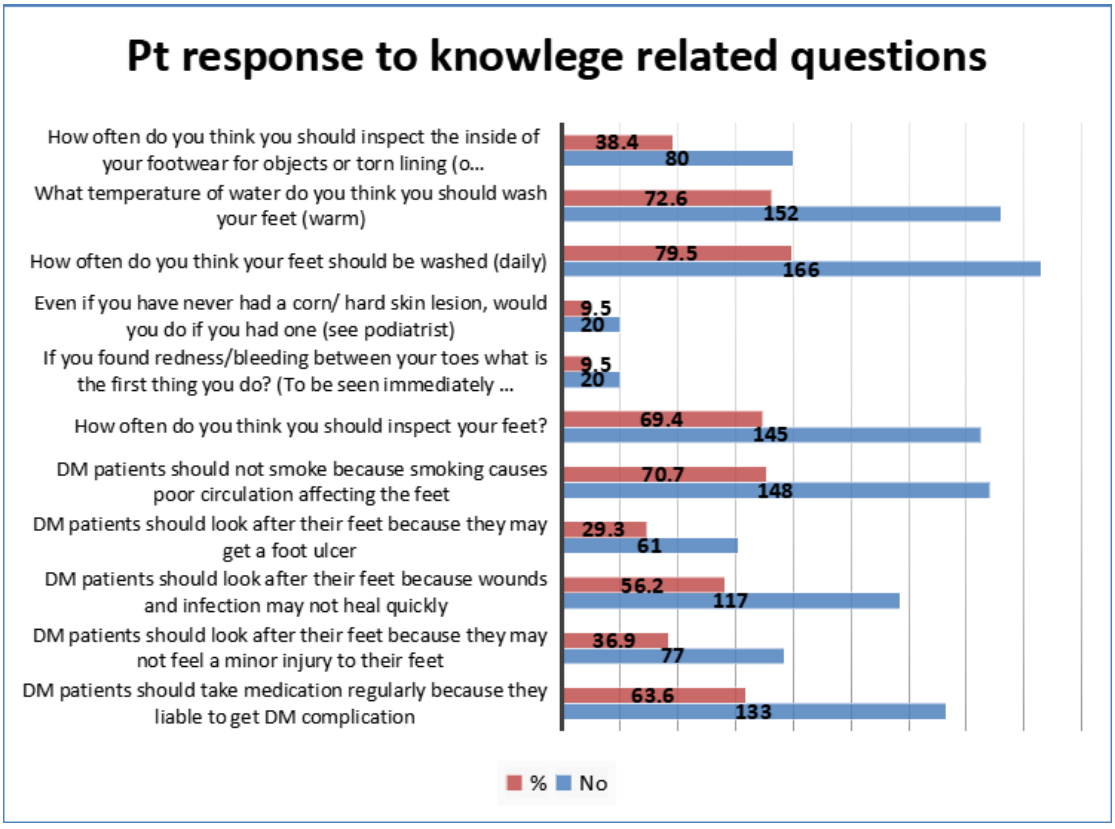
Demographic Profile

The study included 209 patients ranging in age from 16 to 79 years (mean 45.6 years, SD 16.7). Gender distribution was approximately equal, with the majority being married (71%), native to the region (96.6%), and urban residents (87.1%). Almost two-thirds (65.1%) were unemployed with monthly incomes between INR 5,000 and 15,000. Type 2 diabetes was prevalent among 83.4% of participants. The primary source of information was healthcare staff (79.8%), followed by friends/relatives (18.6%).



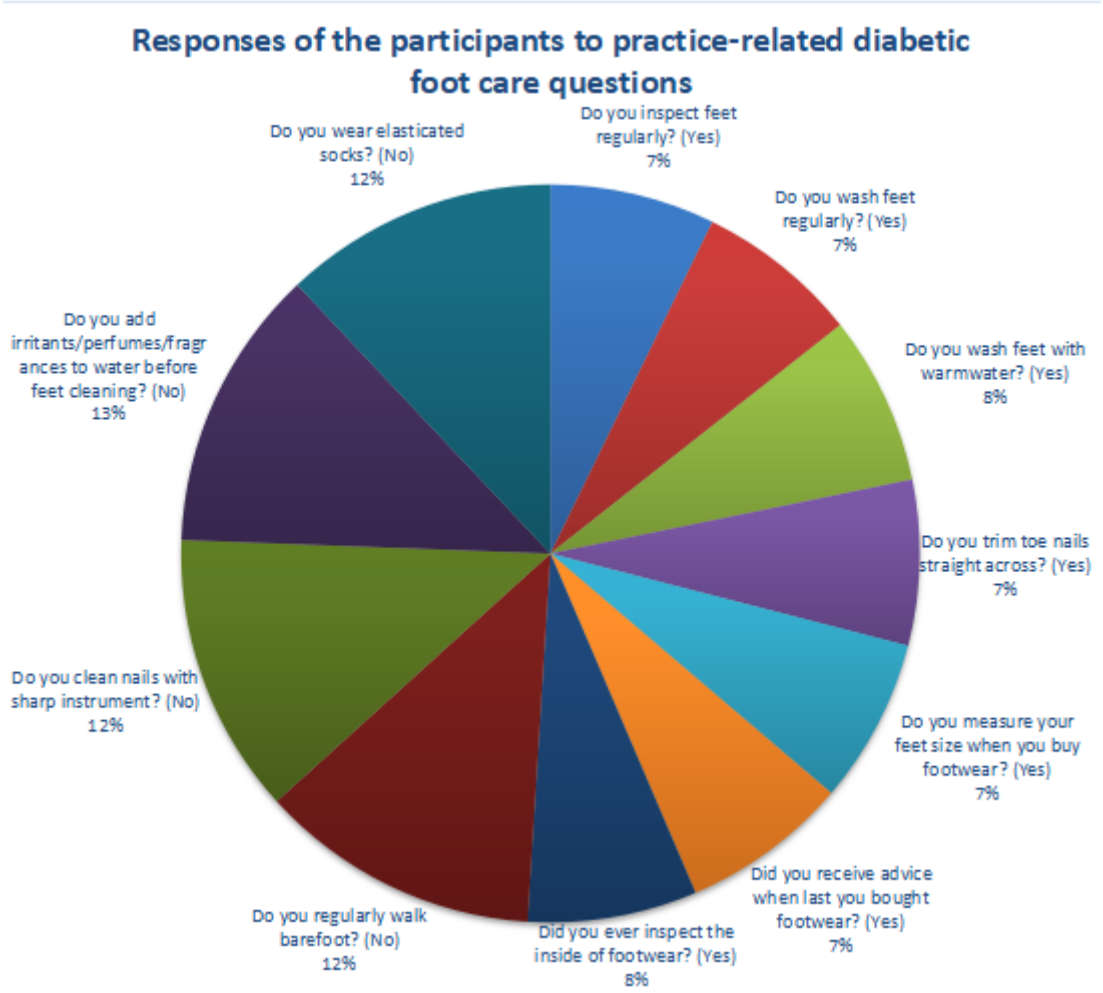
Knowledge About Diabetic Foot Care

Most participants correctly knew that feet should be washed daily (79.5%) and preferably with warm water (72.6%). About two-thirds understood that diabetic patients should avoid smoking due to its negative effects on circulation. However, only one-third knew that diabetic patients require more meticulous foot care than the general population, and fewer than 10% knew to seek immediate medical attention for redness or bleeding between toes. Overall, approximately 75% of participants had inadequate knowledge, while less than 5% demonstrated adequate knowledge.



Foot Care Practices

Despite low knowledge levels, about two-thirds of respondents practiced reasonable foot care. Approximately 63% had adequate knowledge of good practices related to hygiene and regular foot care. Most patients avoided adding irritants to foot-cleaning water (63.1%), walking barefoot (62.8%), cleaning nails with sharp instruments (62.3%), and wearing elasticated socks (61.4%). However, only 33.2% regularly inspected their feet, and 37.7% washed their feet regularly.



Discussion

The study revealed that respondents whose primary information source was healthcare staff demonstrated the highest knowledge levels, highlighting healthcare providers' crucial role in patient education. While most participants (79.5%) correctly knew to wash feet daily with warm water and understood the negative effects of smoking on circulation, few recognized that diabetic foot ulcers can be asymptomatic or that redness/bleeding between toes requires immediate medical attention.

The overall low knowledge level (75% inadequate) aligns with findings from similar studies in Nepal (12.3%)[16], South Africa (32.4%)[17], Iran (23.3%)[18], Saudi Arabia (26%)[19], Nigeria (30.1%)[20], and Malaysia (42%)[21], where inadequate knowledge ranged widely. These variations may result from demographic differences, assessment tools, and regional training programs[22].

Despite knowledge deficits, 63% of patients demonstrated good foot care practices, contrasting with studies in Malaysia[21] and Thailand[23], where 61.8% and 60% of patients respectively showed poor

foot care practices.

Our findings are consistent with Pollock et al.[24], who reported that half of diabetic patients were unaware that smoking affects circulation to the feet. Similarly, few participants in both studies knew about the potential for asymptomatic foot ulcers or the importance of seeking immediate medical attention for interdigital lesions.

Limitations

The study had two primary limitations:

- All participants came from a single medical college in Haryana, potentially limiting generalizability to the broader diabetic population in India
- Factors such as glycemic control, medication adherence, accessibility, and family support were not investigated, which could impact results

Conclusion

This study found that low knowledge levels regarding foot care are common among diabetic patients attending outpatient clinics at Adesh Medical Research Centre in Haryana. However, approximately two-thirds demonstrated good foot care practices despite knowledge deficits. Educated and employed patients, those with Type 2 diabetes, and those receiving information from healthcare professionals showed better foot care knowledge than their counterparts.

The findings emphasize the need for educational interventions and management strategies promoting good diabetic foot self-care practices to reduce suffering associated with diabetic foot complications[25]. Simple assessment tools like the questionnaire used in this study could help achieve this goal.

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