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Knowledge And Awareness Of Diabetic Patients Towards Diabetic Foot In Developing Countries; Systematic Review.

Running Title: Knowledge And Awareness Of Diabetic Patients Towards Diabetic Foot In Developing Countries.

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Abstract

**Background:** Uncontrolled glycemic levels can lead to significant diabetic complications. Diabetic foot is regarded as one of the most frequent complications. Hence, the knowledge of patients about their foot care as well as controlling their blood glucose levels can significantly reduce the incidence of the diabetic foot and consequent amputation in severe cases.

**Objective:** This systematic review of the literature will assess the knowledge and awareness of diabetic patients living in developing countries towards the diabetic foot.

**Method:** The medical literature was examined against Medline, OVID, Embase, and PubMed databases over the last ten years between January 2010 to December 2020. The included searching terms were a combination of "Knowledge" OR "Awareness" OR "attitudes" OR "perception" OR "behavior" AND "diabetes" AND "patient" AND "diabetic foot." The second stage was selecting results, such that to include only original studies examining the knowledge and awareness of diabetic patients towards the diabetic foot. Selected trials evaluated the knowledge towards diabetic foot care among diabetic patients in a developing country.

**Result:** A total of 89 articles resulted. following the removal of review papers and including original research solely, 14 articles showed up. Eight articles were found to be eligible for inclusion, covering 1877 patients who were questioned through cross-sectional studies about their knowledge and attitudes towards caring for their feet and diabetic foot complication. The knowledge about diabetic foot is generally inadequate, particularly among patients with low socioeconomic levels.

**Conclusion:** Knowledge and attitudes of diabetic patients towards diabetic foot in developing countries is considered inadequate and require improvement. Future studies should study the correlates between poor knowledge and clinical outcomes of diabetic foot.

**Keywords:** Diabetic foot, diabetes, patients, knowledge, awareness, Developing countries.
Introduction

Diabetes mellitus is a leading metabolic disease and a major global health issue [1]. Almost 450 million patients had a diabetes diagnosis, compared to 100 million twenty years earlier [2]. The prevalence of diabetes is growing up to its double since the year 1980 in both developing and developed countries. In adults, the prevalence of diabetes increased from 5% to 9% [3].

Currently, the diagnosis of diabetes is estimated to be 200 million patients [4]. By the year 2025, it is estimated that the number of patients with diabetes will reach 300 million, with the highest estimates for the diseases are expected to be in developing countries [5]. Furthermore, mortality because of diabetes is proposed to be about three million patients annually [6].

Lack of knowledge and awareness about diabetic complications can drastically elevate the rates of morbidity and mortality linked to the disease [7]. Furthermore, low socioeconomic conditions and social exclusion can lead to a significant elevation in the incidence of diabetic complications [8]. Hence, developing countries suffer from higher rates of complications compared to developed countries [9].

Diabetic foot is a major type of diabetic complication; though easily prevented, it can occur in up to half of the patients [10]. Additionally, it is the major cause of lower limb amputation in almost half of the diabetic patients, in addition to a third of hospital admissions among diabetic patients [11].
Diabetic foot can significantly reduce the quality of life and limit the physical activity of diabetic patients [12]. It can significantly surge healthcare costs. This cost represents a massive burden, particularly in developing nations. Accordingly, educating patients about their diabetic foot care can improve the quality of life of patients as well as preserve limited hospital resources in developing countries [13].

Therefore, this systematic review of the literature will evaluate and assess the knowledge levels and awareness of diabetic patients in different developing countries towards diabetic foot prevention and complications over the past decade.

**Review**

**Methodology**

The current systematic review of the literature was completed using the PRISMA checklist guidance for systematic review and meta-analysis [14]. This review was implemented via examining electronic databases to comprise eligible research articles between January 2010 and December 2020 in four databases, including Medline, OVID, Embase, and PubMed databases. **Search Strategy**

Searching keywords comprised "Knowledge" OR "Awareness" OR "attitudes" OR "perception" OR "behavior" AND "diabetes" AND "patient" AND "diabetic foot." All the titles and abstracts arising from this primary exploration were examined thoroughly to avoid missing any potential articles. The findings were then revised to select only original research articles evaluating the evaluated knowledge towards diabetic foot care among diabetic patients in a developing country. Chosen articles should mention the country (developing one) and the aspect evaluated (knowledge, attitude, perception).
Additionally, all studies from different countries were eligible. Only articles in English were classified as articles of relevance, which processed into the second stage.

**Eligibility Criteria**

The second stage was deciding on the inclusion criteria to choose the eligible research articles. Abstracts were assessed manually to choose the related abstracts for revision. The inclusion criteria were carrying out the study in developing countries and evaluating the knowledge and awareness of diabetic foot in patients. Moreover, the references of eligible research articles were examined to find any proposed articles. The final stage was gathering the pre-defined information from the final record of eligible articles and summarized them. Reviews, studies that had incomplete or overlapped data were excluded. Also, unavailable full-text articles or inappropriate study designs were excluded. The full description of the search strategy is shown in figure 1.
Data Review and Analysis

Stage one in the data review included a preliminary review. Using a specially designed excel sheet, data was extracted. Chosen data from eligible research articles were then
revised via the excel sheet. Any research articles published by one research group examining similar variables were reviewed for any potential duplication.

**Results**

Following the stage of abstracts examination and the assessment of the eligibility criteria to identify potential abstracts, there was eight articles [15-22] regarded as potential for inclusion published during the past decade, covering 1877 diabetic patients from different developing countries.

All the included studies had a cross-sectional design, using questionnaires to assess the knowledge and attitude towards the diabetic foot and its complications. Studies were performed in different developing countries, where studies were from [15, 16, 20, 21] Saudi Arabia, one study was from Sri Lanka [17], Malaysia [18], Sudan [19], and Brazil [22].

All the studies examined the knowledge and awareness towards diabetic foot in type 2 diabetic patients. It has been demonstrated that patients with lower educational level or from low socioeconomic backgrounds had significantly lower knowledge about diabetic foot care and poor behaviour towards the foot and nail care. Additionally, there was a generally inadequate knowledge and awareness towards foot care and the essential information to prevent diabetic foot, with up to half of the included patients in each study were diagnosed with diabetic foot, as detailed in Table 1.
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Year</th>
<th>Study design</th>
<th>Sample size</th>
<th>Country</th>
<th>Objective</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-Jarallah et al. [15]</td>
<td>2020</td>
<td>A cross-sectional survey</td>
<td>351</td>
<td>KSA</td>
<td>to evaluate the knowledge and attitude of diabetic patients about diabetic foot care.</td>
<td>Score for both knowledge and attitude were shown to be low. Females had a significantly higher level of knowledge and attitude (p-value = 0.035). Previous training or attending workshops on diabetic foot care had a significant improvement on knowledge (p-value = 0.027) and attitude (p-value = 0.032).</td>
</tr>
<tr>
<td>Al-Jasim et al. [16]</td>
<td>2020</td>
<td>A cross-sectional survey</td>
<td>77</td>
<td>KSA</td>
<td>To assess the knowledge and awareness towards the diabetic foot.</td>
<td>Less than a third of the patients were educated to the level of secondary school education. Diabetic foot problems were present in 27% for the first time. Patients with secondary education and those suffering from DM for &gt; 15 years had better knowledge. Higher knowledge of diabetic foot disease was weakly correlated with attitudes &amp; practices. The weak correlation between scores of knowledge &amp; attitudes and practices can be attributed mainly to poor compliance.</td>
</tr>
<tr>
<td>Kaluarachchi et al. [17]</td>
<td>2020</td>
<td>A cross-sectional survey</td>
<td>245</td>
<td>Srilanka</td>
<td>To evaluate the prevalence of diabetic foot disease, knowledge, and practices about diabetic foot care among diabetic</td>
<td>Diabetic foot disease was present in (6.9%) patients. Peripheral neuropathy was significantly correlated to current or past foot ulcer for &gt; 2 weeks to heal (p &lt; 0.05). Knowledge about foot care was low, and it</td>
</tr>
</tbody>
</table>
Diabetic foot diagnosis was significantly correlated to foot care knowledge and practices ($p < 0.05$).

About 59.6% had poor foot care practice, and about half of the patients had poor awareness level. Increasing age and a good awareness of foot problems showed better foot care practice. Though, Malay ethnicity and obesity were associated with poor foot care.

Good glycemic control (HbA1c) was achieved by 41.3% only. Good knowledge about diabetic foot was reported in 46.7%, poor knowledge 29.3%, and moderate knowledge 24%. Good awareness toward diabetic foot was reported by 42.6%, moderate by 36.7%, and poor by 20.7%. The awareness and practices were significantly linked to an increase in ages (51 years), longer duration of diabetes $>10$ years, family history a higher level of education, medium income, controlled diabetes mellitus, and education about diabetes complications and diabetic foot care ($P$-value $< 0.05$).

The duration of diabetes was more than ten years among 65%. The most frequent diabetic foot complication was foot numbness and stiffness. Knowledge about a diabetic foot was good among 77%, while
23% had insufficient knowledge regarding diabetic foot ulcers. Good awareness was significantly correlated to higher educational levels.

Diabetic foot ulcers were observed among 26%. The majority of participants had a good education and favorable attitudes towards diabetic foot care. Despite these positive results, a high proportion of patients ignored essential information and instructions before buying new shoes.

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Design</th>
<th>Sample Size</th>
<th>Country</th>
<th>Objective</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-Hariri et al. [21]</td>
<td>2017</td>
<td>Cross-sectional study</td>
<td>229</td>
<td>KSA</td>
<td>To assess the knowledge, attitudes, practices, and risk factors influencing diabetic foot ulcers among patients.</td>
<td>23% had insufficient knowledge regarding diabetic foot ulcers. Good awareness was significantly correlated to higher educational levels.</td>
</tr>
<tr>
<td>Policarpo et al. [22]</td>
<td>2014</td>
<td>Cross-sectional study</td>
<td>85</td>
<td>Brazil</td>
<td>To evaluate the knowledge, attitudes, and practices for the prevention of diabetic foot.</td>
<td>49.4% had no knowledge of hygiene or what to observe in their feet. 56.5% did not know of the correct way to cut nails. 80% were willing to engage in self-care. washing, drying, moisturizing and massaging were not executed together.</td>
</tr>
</tbody>
</table>


Discussion

Diabetic foot is a common complication that can have a significantly negative impact on patients with diabetes, particularly type 2 diabetes. Although the causes of diabetic foot are multifactorial, it can be easily prevented by following good hygienic measures for foot and nail care. Hence, patients should be educated about the strategies to prevent the diabetic foot from reducing their impact on their quality of life.

The present systematic review of the literature examined the studies evaluating the knowledge and awareness of diabetic patients over the last ten years towards diabetic foot in developing countries. It has been found that the level of knowledge among diabetic patients is insufficient; however, patients are willing to learn about their foot care if they are educated about it and had the required facilities. Furthermore, poor educational levels and socioeconomic conditions were major contributors to inadequate awareness and behavior towards diabetic foot care.

The review included studies from different developing countries. Though, it appears that research teams in Saudi Arabia showed the highest awareness levels of the problem of the diabetic foot, with four studies [15, 16, 20, 21] published over the last four years to measure the knowledge and awareness of patients in different regions in the country.

Most recently, Al-Jarallah et al. [15] showed that Saudi females and diabetic patients who received previous training on diabetic foot showed significantly better knowledge and attitudes towards the diabetic foot. Nevertheless, the knowledge and awareness among the Saudi population, according to Al-Jarallah et al. [15], was generally low.
Another smaller study in Saudi Arabia by Al-Jasim et al. [16] found that about a third of the included cohort suffered from diabetic foot problems for the first instance. Also, Al-Jasim et al. [16] demonstrated that the longer the duration of diabetes, the better the knowledge towards the diabetic foot. Though, poor compliance was correlated to the low level of knowledge and poor attitudes towards the diabetic foot.

Similarly, Alhabshan et al. [20] demonstrated a high prevalence of diabetic foot among Saudi patients, where the most occurring symptom with the diabetic foot was numbness and stiffness. Alhabshan et al. [20] demonstrated that up to a quarter of the included patients had poor knowledge levels about a diabetic foot, while patients with higher educational levels showed better knowledge compared to their peers.

Furthermore, Al-Hariri et al. [21] reported an incidence of the diabetic foot of up to 26%, where patients with high education levels demonstrated better attitudes, confirming the findings of Alhabshan et al. [20]. However, Al-Hariri et al. [21] also noted that there was a large proportion of patients who were not aware of critical instructions for buying new shoes for a diabetic foot.

The findings from Saudi Arabia were not different from the findings from other countries. In Sri Lanka, Kaluarachchi et al. [17] described a poor knowledge level about diabetic foot care, which was correlated to poor practice towards the diabetic foot. On the other hand, Kaluarachchi et al. [17] reported a much lower incidence of diabetic foot (about 6.9%) compared to the incidence of the disease in Saudi Arabia.

Comparable knowledge and awareness levels were also reported in Sudan [19], Malaysia [18], and Brazil [22]. However, in Sudan [19], a good level of glycaemic control was
reported in just below half of the patients, while a third of the included patients had poor knowledge about a diabetic foot. Additionally, older age, higher education, medium income, longer diabetes duration, and family history were all significantly correlated to the knowledge and awareness towards the diabetic foot.

Nevertheless, the present review suffered from some limitations. All the included studies had a survey design, which is limited by the subjective views of the patients as well as their honesty while responding to the questions of the questionnaire. Also, all the reports were limited by their lack of external validity. These limitations should be avoided in any future investigations.

**Conclusion**

Diabetic patients in developing countries have inadequate knowledge levels towards diabetic foot and foot and nail care. This insufficient knowledge has reflected on the incidence of diabetic foot prevalence in these countries. Accordingly, public health leaders should consider organizing public events and workshops in diabetes clinics for diabetic patients in developing countries in order to improve their knowledge about the disease and reduce its incidence and subsequent complications.

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References


