









Awareness Level of Diabetic Neuropathy and Its Complications Among Taif City Population in Saudi Arabia

Adnan A Mubarak ^{1,*}, Naif M Alotaibi ^{2,*}, Ahmed Abdulrahan Alshaer ^{2,*}, Mohammed H Alhamayani ^{2,*}, Meshal F Althobaiti ^{2,*}, Alsharif M Alqurashi ^{2,*}, Asrar Alqaedi ^{3,*}, Huda Abdullah Aljehafy ^{4,*}

¹Department of Medicine, Faculty of Medicine, Taif University, Taif, Saudi Arabia; ²Intern Medical Student, Faculty of Medicine, Taif University, Taif, Saudi Arabia; ³Department of Pediatric Nephrology, Taif Children Hospital, Taif, Saudi Arabia; ⁴Department of Pediatrics, Taif Children Hospital, Taif, Saudi Arabia

*These authors contributed equally to this work

Correspondence: Naif M Alotaibi, Email legend.otibah@gmail.com

Background: Diabetes mellitus (DM) has become one of the most prevalent medical conditions worldwide. Despite the fact that DM affects a substantial proportion of the Saudi population over the age of 30, the general level of awareness of diabetic neuropathy has been reported to be poor in Saudi Arabia.

Objective: To determine the level of awareness of diabetic neuropathy and its complications among the population of Taif City.

Methods: This cross-sectional study evaluated the level of awareness of diabetic neuropathy among the population of Taif City using an online pre-designed self-administered questionnaire.

Results: Of 486 participants enrolled in the study, 57.2% were females and 42.8% were males. In addition, 88.1% of the participants were Saudis. Our study showed that awareness of diabetic neuropathy and its complications among the population of Taif was almost non-existent, with 83.9% of the participants having never heard of diabetic neuropathy in their life. The level of awareness of this disorder was scored as 7.65 1.01 out of a total of 18, even though the educational level of the participants was excellent, and 61.3% of them had a university degree and above.

Conclusion: This is the first report demonstrating the knowledge of diabetic neuropathy among residents of Taif City. Regardless of educational level, the knowledge of diabetic neuropathy was poor, necessitating greater efforts to increase public awareness using different approaches and campaigns. This will help in the early detection of such complications and impact the response to different treatment modalities.

Keywords: diabetes mellitus, diabetic neuropathy, diabetic complications, level of awareness, taif

Introduction

Diabetes mellitus (DM) is one of the most common medical conditions in the world, affecting more than 400 million people of different age groups around the globe.¹ In Saudi Arabia, diabetes has been reported to affect 25% of the population over the age of 30 years.² In addition, it is associated with a plethora of medical, personal, and social problems. There are two types of DM: type 1 DM is characterized by a lack of insulin production by the pancreas, while type 2 DM (T2DM) is a long-term metabolic condition characterized by high blood sugar, insulin resistance, and insulin insufficiency.³ Furthermore, diabetic complications are traditionally divided into two major categories: macrovascular complications such as cardiovascular disease, cerebral stroke, and peripheral arterial disease, and microvascular complications such as diabetic retinopathy, nephropathy, and neuropathy.⁴ Diabetic Neuropathy is the most common complication of diabetes, which can result in weakness due to muscle atrophy.⁵ Globally, approximately 10%-20% of diabetic patients are diagnosed with peripheral neuropathy at the time of their primary diagnosis. According to some studies, the development of diabetic neuropathy is directly proportional to the chronicity of the disease, which means that after five years of developing diabetes, approximately

26% of the patients develop diabetic neuropathy, with this percentage rising to 41% after another five years, and eventually reaching approximately 66% after further progression over the years.⁶ In a previous study, 19.9% of diabetic patients were diagnosed with diabetic peripheral neuropathy (DPN) and these patients were older, had diabetes for a longer period, and had a higher incidence of abdominal obesity and hypertension compared to their counterparts without DPN.⁷

A study conducted in Alkobar City of Saudi Arabia found that the prevalence of peripheral neuropathy in patients with T2DM was 37.4%, and approximately 60% of these patients were unaware of the importance of daily foot care.⁸ Another study conducted in Riyadh discovered that 35.5% of diabetic patients included in the study had paresthesia, which could lead to more severe complications over time.⁹ A lack of awareness about DPN was also noted in diabetic patients from Al-Ahsa City.¹⁰ Furthermore, in a study conducted in Jeddah, it was noted that 23% of patients with diabetes did not know about foot ulcers being a complication of diabetic neuropathy and that poor diabetic control affects the health of blood vessels and nerves, resulting in foot ulcers, gangrene, and possibly lower-extremity amputation.^{11–13} This indicates a lack of knowledge regarding the dangers posed by diabetic complications among diabetic patients in Saudi Arabia.

Objectives of the Study

This study aimed to determine the level of awareness of diabetic neuropathy and its complications among the population of Taif City in Saudi Arabia.

Subjects and Methods

Study design: Cross-sectional.

Study duration: December 2021 to February 2022.

Study settings: A cross-sectional study was conducted to evaluate the level of awareness of diabetic neuropathy among the population of Taif.

Sampling and population (including inclusion and exclusion criteria): All residents aged 20 years and above and accepted to participate by clicking (Yes) in the given questionnaire, were included in this study.

Exclusion criteria: all residents under the age of 20 years or who refused to participate by clicking (No) in the given questionnaire, were excluded from the analysis.

Tools and data collection procedure: All study participants were requested to consent to their approval prior to completing an online pre-designed self-administered questionnaire. An explanatory statement on how the data is used in this study before their participation was provided.

Statistical design: Data was entered through Excel version 16.0.6742.2048 and all statistical analysis was done using Statistical Product and Service Solutions (SPSS) (IBM SPSS Statistics for Windows, Version 23.0, Armonk, NY). P value <0.05 is considered significant.

Administrative Considerations

1. The research proposal and a request letter were submitted to the dean of the College of Medicine and vice dean of scientific research for approval before study commencement.
2. A letter was issued to the Chairman of the Research Ethics Committee to seek permission to conduct the study.
3. All the required documents were completed and submitted to the Research Ethics Committee for ethical approval.

Expected outcomes of the study: Low level of awareness about diabetic peripheral neuropathy and its complications among the population (including healthy people and diabetic patients) of Taif City.

Results

Characteristics of the Participants

A total of 486 participants were included in this analysis, of which 57.2% were females and 42.8% were males. More than 75% of participants were below the age of 39; specifically, 94.9% were in the age group of 15–39. Saudis accounted

Table 1 Demographic Data of Participants (n=486)

Variable		N (%)
Gender	Male	208 (42.8)
	Female	278 (57.2)
Age	15–39	461 (94.9)
	40–59	25 (5.1)
	60 or more	0 (0)
Nationality	Saudi	428 (88.1)
	Non-Saudi	58 (11.9)
Social status	Single	427 (87.9)
	Married	54 (11.1)
	Divorced/ widowed	5 (1)
Education	Illiterates	3 (0.6)
	Primary/Intermediate school	12 (2.5)
	High school	173 (35.6)
	College and above	298 (61.3)
Job	Government employee	21 (4.3)
	Private sector employee	24 (4.9)
	Student	359 (73.9)
	Unemployed	82 (16.9)

for 88.1% of the participants, and 87.9% were single. A large proportion of participants were students (73.9%), with 61.3% having a college degree or higher (Table 1).

Awareness of Diabetic Neuropathy and Its Complications

Only 4.9% of participants had diabetes, while 82.9% of non-diabetics knew someone who had diabetes (Figure 1). While 83.1% of participants had never heard of diabetic neuropathy, 16.9% were aware of it (Figure 2a). These 16.9% of participants were asked about the most commonly affected body parts by DPN, and their responses were as follows: feet (14.4%), hands (1.4%), face (0.6%), chest (0.2%), and back (0.2%).

Numbness was the most identified (75.6%) symptom of diabetic neuropathy, followed by weakness or loss of sensation (73.2%), pain (34.1%), muscle weakness or atrophy, unsteadiness while standing or walking (32.9%), and stiff extremities (23.2%) (Figure 2b).

Out of the 82 participants who had heard about diabetic neuropathy, 77 (93.9%) thought that the regular dietary intake of a diabetic patient and perseverance in treatment contributed to reducing the incidence of diabetic neuropathy, 80 (97.6%) said that diabetic neuropathy can lead to serious complications, and 75 (91.5%) strongly agreed that it is important to take care and protect the feet from injuries and wounds to avoid complications. Among those who had heard of diabetic neuropathy, 66% were aware that amputation is a possible complication of diabetic neuropathy, followed by gangrene (17%), and ulcers of the feet (5%) (Figure 2c).

As shown in Table 2, the mean (\pm SD) diabetes knowledge score of participants who heard about diabetic neuropathy was 7.65 ± 1.01 out of a total score of 18. Therefore, the performance of participants was not good in terms of general

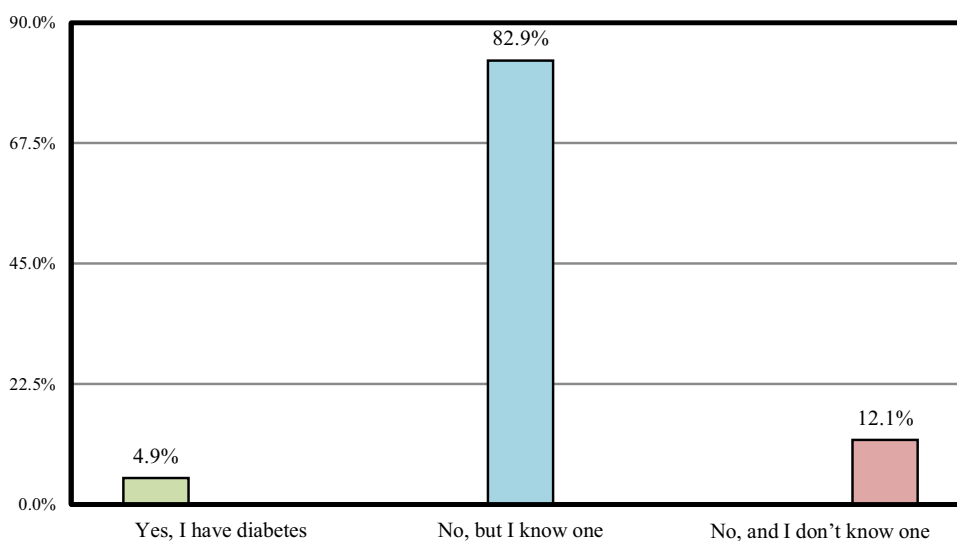
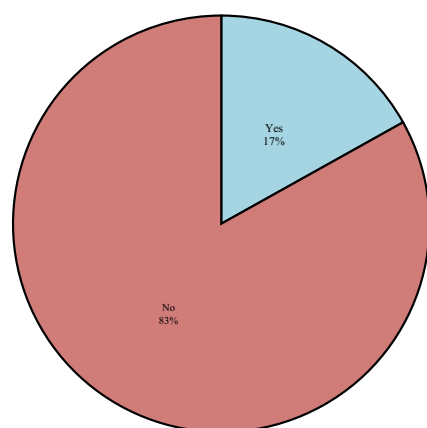
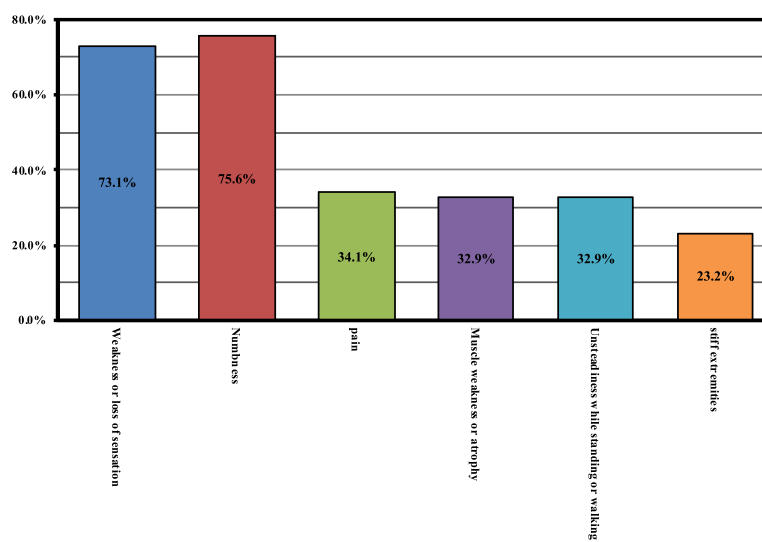


Figure 1 Diabetic status of the participants (n=486).

a



b



c

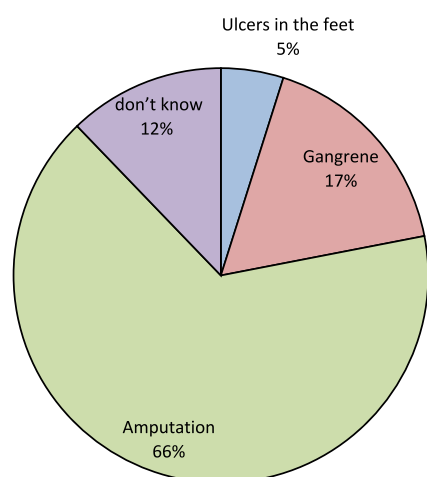


Figure 2 (a) Number of participants who had heard about diabetic neuropathy (n=486). (b) Awareness regarding symptoms of diabetic neuropathy (n=82). (c) Awareness regarding complications of diabetic neuropathy (n=82).

Table 2 Level of Awareness of Diabetes and Its Complications Among Who Heard About Diabetic Neuropathy

	General Knowledge	Symptoms	Complications	Overall Score
Total possible score	7	6	5	18
Mean \pm SD	03.55 \pm 1.01	02.53 \pm 1.01	1.57 \pm 1.01	7.65 \pm 1.01
Percentage	51%	42%	32%	43%

knowledge regarding DM. Furthermore, the data showed that the knowledge of symptoms and complications of diabetes was 42% and 32%, respectively (Table 2).

Discussion

The current study revealed that awareness of diabetic neuropathy and its complications among the population of Taif City is poor, since 83.9% of the study participants had never heard of diabetic neuropathy in their lives and only about 16.1% were aware of this condition. The level of awareness of this disorder was low, even though the educational level of the participants in this study was excellent, with 61.3% of participants having a university education or above. One of the traditionally accepted reasons for a community's lack of health awareness is the lack of education. However, despite the spread of education in Taif, awareness of diabetes was low, and one of the reasons may be that people did not acquire awareness and knowledge about the disease through television, news, and media platforms to protect themselves and their families, as their focus was on health education provided by competent authorities and health awareness campaigns. This is consistent with the results of several previous studies, which have indicated that DM patients in Saudi Arabia have poor knowledge of the disease. Al-Aboudi and his colleagues found that 15% of DM patients had insufficient knowledge of diabetes, while 72% had average knowledge. In a study conducted by Binhemd, 10 patients with DM in Dammam received low scores for knowledge and attitude toward DM. In another survey of DM patients by Al-Maliki et al 11, 49% of the participants gave correct answers to DM-related questions, highlighting a gap in the knowledge of DM in this population.^{14–16} On the other hand, our results contradict previous studies from other parts of the world, which have shown an association between higher education levels and increased knowledge of diabetic neuropathy.^{17–19}

In the present study, 42% and 32% of those who had heard of diabetic neuropathy knew its symptoms and complications, respectively. Complications related to diabetic neuropathy can negatively impact the quality of life.²⁰ This finding is similar to that of the study by Aljoudi and Taha (2009), who reported a “lack of knowledge of diabetic neuropathy complications in eastern Saudi Arabia”. This observation could be attributed to the use of open-ended questions in the aforementioned study. Furthermore, the current study revealed that, although the majority of participants had a university education or higher, there was a serious level of ignorance regarding diabetic neuropathy, with 32% of Taif's population unaware of its complications.²¹ Likewise, awareness of the complications of diabetic neuropathy is low in Pakistan. Ulvi et al (2009) stated that nearly 88% of respondents in their study had no idea of diabetic complications.²² The longer a person has diabetes, the more likely they are to experience psychological complications, such as depression.²³ Moreover, the demand for efforts to educate the general population about the complications of diabetic neuropathy has also been reported in India and Malaysia.²⁴ Increasing caregivers' knowledge about these complications is important in decreasing their incidence.²⁵

Conclusions

This is the first study to evaluate the knowledge of diabetic neuropathy among residents of Taif, a city in southwest Saudi Arabia. Irrespective of educational level, the general knowledge of diabetic neuropathy among participants was poor, necessitating enhanced efforts through widespread campaigns and health awareness programs to increase diabetic neuropathy awareness among residents of Taif. This will help in the early detection of such complications and impact the response to different treatment modalities.

Ethical Approval

Ethical approval was granted (From December 2021 to December 2022) by the ethics committee at Taif University accredited by the National Committee for Bioethics with No. (HAO-02-T-105). The study application No. (43-107).

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Taif university accredited by the National Committee for Bioethics with No. (HAO-02-T-105). The study application No. (43-107).

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not for-profit sectors.

Disclosure

The authors report no conflicts of interest in this work.

References

1. He X, Ou C, Xiao Y, Han Q, Li H, Zhou S. LncRNAs: key players and novel insights into diabetes mellitus. *Oncotarget*. 2017;8(41):71325. doi:10.18632/oncotarget.19921
2. Aljohani MM, Karam AT, Abdulaziz A, Alamri MH, Alnakhl HA, Shaqroon HA. Diabetic neuropathy in Saudi Arabia: a comprehensive review for further actions. *Endocrinol Metab Res*. 2020;5.
3. Rujaswini T, Praveen D, Chowdary PR, Aanandhi MV, Shanmugasundaram P. A review on association of serum homocysteine in diabetic neuropathy. *Drug Innovation Today*. 2018;10(2):154–156.
4. Callaghan BC, Cheng HT, Stables CL, Smith AL, Feldman EL. Diabetic neuropathy: clinical manifestations and current treatments. *Lancet Neurol*. 2012;11(6):521–534. doi:10.1016/S1474-4422(12)70065-0
5. Azhary H, Farooq MU, Bhanushali M, Majid A, Kassab MY. Peripheral neuropathy: differential diagnosis and management. *Am Fam Physician*. 2010;81(7):887–892.
6. Dyck PJ, Kratz KM, Karnes JL, et al. The prevalence by staged severity of various types of diabetic neuropathy, retinopathy, and nephropathy in a population-based cohort: the Rochester Diabetic Neuropathy Study. *Neurology*. 1993;43(4):817. doi:10.1212/WNL.43.4.817
7. Alwin Robert A, Al Dawish MA. Microvascular complications among patients with diabetes: an emerging health problem in Saudi Arabia. *Diab Vasc Dis Res*. 2019;16(3):227–235. doi:10.1177/1479164118820714
8. Jatooi NA, Alsulaiman ASA, Alromaih NJ, et al. Prevalence of diabetic peripheral neuropathy among type II diabetic patients in King Fahd University Hospital, Khobar, Kingdom of Saudi Arabia. *Hosp Pract*. 2021;49(2):63–70. doi:10.1080/21548331.2020.1853995
9. AlOwais MM, Shido OA. Knowledge and practice of foot care in patients with diabetes mellitus attending primary care center at Security Forces Hospital, Riyadh, Saudi Arabia: a cross-sectional study. *J Family Med Prim Care*. 2020;9(12):5954. doi:10.4103/jfmpc.jfmpc_943_20
10. Alhashim BN, Zaher A, Albujaays DS, Alhashim J, Ali SI. Study of the level of awareness of diabetic neuropathy among diabetic patients in Al-Ahsa region, Kingdom of Saudi Arabia: a cross-sectional study. *Int J Sci Study*. 2018;5(1):1–6.
11. Al Amri AM, Shahrani IM, Almaker YA, et al. Knowledge, Attitude, and Practice Regarding Risk of Diabetic Foot Among Diabetic Patients in Aseer Region, Saudi Arabia. *Cureus*. 2021;13(10). doi:10.7759/cureus.18791
12. Cardoso NA, Cisneros de L, Machado CJ, Procópio RJ, Navarro TP. Risk factors for mortality among patients undergoing major amputations due to infected diabetic feet. *J Vasc Bras*. 2018;17(4):296–302. doi:10.1590/1677-5449.010717
13. Pemayun TGD, Naibaho RM, Novitasari D, Amin N, Minuljo TT. Risk factors for lower extremity amputation in patients with diabetic foot ulcers: a hospital-based case-control study. *Diabet Foot Ankle*. 2015;6(1):29629. doi:10.3402/dfa.v6.29629
14. Al-Aboudi IS, Hassali MA, Shafie AA. Knowledge, attitudes, and quality of life of type 2 diabetes patients in Riyadh, Saudi Arabia. *J Pharm Bioallied Sci*. 2016;8(3):195. doi:10.4103/0975-7406.171683
15. Binhemd TA. Diabetes mellitus: knowledge, attitude, practice and their relation to diabetes control in female diabetics. *Ann Saudi Med*. 1992;12(3):247–251. doi:10.5144/0256-4947.1992.247
16. Almalki TM, Almalki NR, Balbaid K, Alswat K. Assessment of diabetes knowledge using the Michigan brief diabetes knowledge test among patients with type 2 diabetes mellitus. *J Endocrinol Metab*. 2018;7(6):185–189. doi:10.14740/jem473w
17. Al Shafae MA, Al-Shukaili S, Rizvi SGA, et al. Knowledge and perceptions of diabetes in a semi-urban Omani population. *BMC Public Health*. 2008;8(1):1–8. doi:10.1186/1471-2458-8-249
18. Caliskan D, Ozdemir O, Ocaktan E, Idil A. Evaluation of awareness of diabetes mellitus and associated factors in four health center areas. *Patient Educ Couns*. 2006;62(1):142–147. doi:10.1016/j.pec.2005.06.018
19. Kamel NM, Badawy YA, El Zeiny NA, Merdan IA. Sociodemographic determinants of management behaviour of diabetic patients. Part II. Diabetics' knowledge of the disease and their management behaviour. *EMHJ-Eastern Mediterranean Health J*. 1999;5(5):974–983. doi:10.26719/1999.5.5.974
20. Alhajji AM, Alkhlaif ZK, Bukhamsin SA, Alkhars FS, Al-Hussaini H. Diabetic Neuropathy: prevalence and Impact on Quality of Life in Al-Ahsa, Saudi Arabia. *Cureus*. 2022. doi:10.7759/cureus.33176
21. Murugesan N, Snehalatha C, Shobhana R, Roglic G, Ramachandran A. Awareness about diabetes and its complications in the general and diabetic population in a city in southern India. *Diabetes Res Clin Pract*. 2007;77(3):433–437. doi:10.1016/j.diabres.2007.01.004
22. Aljoudi AS, Taha AZA. Knowledge of diabetes risk factors and preventive measures among attendees of a primary care center in eastern Saudi Arabia. *Ann Saudi Med*. 2009;29(1):15–19. doi:10.4103/0256-4947.51813

23. Alosaimi A, Alsulaimani N, Alotaibi W. Depressive symptoms in diabetic patients; prevalence, correlates, and moderating effect in Taif, Saudi Arabia. *J Family Med Prim Care*. 2022;11(12):23.
24. Ulvi OS, Chaudhary RY, Ali T, et al. Investigating the awareness level about diabetes mellitus and associated factors in Tarlai (rural Islamabad). *J Pak Med Assoc*. 2009;59(11):798–801.
25. AlZubaidi HAA, Alfaqih ANO, Alothayqi MHA, et al. Knowledge and Practice of the Preventive and Care Methods for Diabetic Foot Among the Caregivers of Diabetic Patients in Saudi Arabia. *Cureus*. 2023. doi:10.7759/cureus.37887

International Journal of General Medicine

Dovepress

Publish your work in this journal

The International Journal of General Medicine is an international, peer-reviewed open-access journal that focuses on general and internal medicine, pathogenesis, epidemiology, diagnosis, monitoring and treatment protocols. The journal is characterized by the rapid reporting of reviews, original research and clinical studies across all disease areas. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/international-journal-of-general-medicine-journal>