OPEN ACCESS

Saudi Journal of Medical and Pharmaceutical Sciences
Abbreviated Key Title: Saudi J Med Pharm Sci
ISSN 2413-4929 (Print) | ISSN 2413-4910 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article **Medicine**

Proportion of Peripheral Neuropathy among Diabetic Patients Attending at Tertiary Level Hospitals

Md Mamun Khan[1], Partha Sarathi Podder[2]*

[1]Department of Community Medicine, Dhaka Medical College, Dhaka, Bangladesh
[2]Department of Community Medicine and Public Health, Green Life Medical College, Dhaka, Bangladesh

DOI: https://doi.org/10.36348/sjmps.2025.v11i07.009 | **Received:** 18.04.2025 | **Accepted:** 24.05.2025 | **Published:** 07.07.2025

***Corresponding author:** Partha Sarathi Podder
Department of Community Medicine and Public Health, Green Life Medical College, Dhaka, Bangladesh

Abstract

Background: The most prevalent consequence of Diabetes Mellitus (DM) is Peripheral Neuropathy (PN), which is frequently undiagnosed and untreated and consequently leading to physical and emotional damage to an individual. Therefore, this study was designed to explore the proportion of peripheral neuropathy among diabetic patients in tertiary care setting. ***Methods:*** This cross-sectional observational study among 403 participants was conducted at the out-patient department of Dhaka Medical College Hospital, Sir Salimullah Medical College, BIRDEM Hospital for one year of period. Data collection was conducted with a pre tested semi structured questionnaire and were analyzed using the statistical software SPSS 26. ***Results:*** Mean age of the respondents was 50.92±10.56 (SD) years with a majority in age group 60-69years (29%). Male and female was observed as equally 51.9% male and 48.1% male. The majority of patients (60.5%) have been living with diabetes for 2-5 years. Significant proportion of the patients (64%) have uncontrolled diabetes, while only 36% have achieved control over their condition. Overall, 48.4% respondents had peripheral neuropathy among diabetic respondents. Among the respondents with peripheral neuropathy, 97(24.1%) respondents had mild NSS, 69(17.1%) had moderate NSS and 29(7.2%) had severe NSS. BMI (25.75±2.65 and 24.81±2.98 kg/m2), HbA1C (8.48±0.78 and 7.98±1.13 %) and triglyceride level (318.79±46.28 vs. 282.52±76.45 mg/dl) were significantly higher among peripheral neuropathy respondents compared to non-neuropathy respondents. ***Conclusion:*** The findings have important clinical implications Lifestyle modifications, such as weight management and diet control, may also be essential in preventing or managing peripheral neuropathy. Early detection of intervention to manage pain should be a priority.

Keywords: Diabetes Mellitus, Peripheral Neuropathy, Body Mass index, Bangladesh.

INTRODUCTION

Diabetes mellitus (DM) is among the most prevalent diseases in the global point of view (Kasim *et al.,* 2009). There are approximately 193 million people living with DM and 46.5% or these patients remain undiagnosed; and among all the undiagnosed patients 81.1% are from low and middle-income countries (World Health Organization: WHO & World Health Organization: WHO, 2023). The Chronic non-communicable disease known as diabetes mellitus is long-term and exerts a massive toll on the quality of life of people, their families and communities all over the world. Out of the estimated total of DM subjects in the global population, 75% is from LMICs and 77.3% (320.5 million) of these sufferers are of working age (International Diabetics Federation, 2015). Long existing hyperglycemic status which is essentially due to onset of diabetes and its diagnosis in an individual is 4-7 years along with degenerative alteration due to ageing there are direct tissue damaging effects which lead to micro/ macro vascular complications (International Diabetics Federation, 2015). The macro-vascular complications are coronary artery disease, peripheral arterial disease and stroke. Among the micro vascular the complications are retinopathy, nephropathy and peripheral neuropathies (Harris *et al.,* 1992; Shobana *et al.,* 2005).

Studies show that Bangladeshi patients are more vulnerable to developing retinopathy and nephropathy as opposed to those from a Caucasian background, but have a relatively lower rate of developing diabetic neuropathies and their ramifications (Kanaya AM *et al.,* 2011). These differences have been explained by variables like height, less pack-year

smoking among the smokers, and higher TCpO2 (Abbott CA, 2010). Trying to segregate patients based on the specific characteristics may be helpful for different clinical subtypes: the motor, sensorimotor, sensory, and/or autonomic nerve fiber involvement and the pattern of symptoms' distribution (Lehmann *et al.,* 2020). Common symptoms of diabetic peripheral neuropathy include tingling, numbness, burning sensations, and pain, all of which can significantly impact quality of life. Peripheral neuropathy also places a notable economic burden on healthcare systems due to increased medical care and reduced productivity. Sensory symptoms are generally more prominent than motor involvement, with symmetric symptom presentation. Many patients report feeling as though their socks are bunched up or that their shoes fit improperly (Callaghan *et al.,* 2012). The signs of diabetic neuropathy vary, with neuropathic pain often described as a deep, aching pain combined with burning and stabbing sensations (Ray *et al.,* 2021). A survey found that 25% to 39% of patients may not receive adequate pain treatment, negatively affecting their quality of life (Ray *et al.,* 2021; Statement of Retraction, 2008).

Peripheral neuropathy is defined as, "the presence of weakness, numbness and pain usually in the hands and feet due to peripheral nerve dysfunction in people with diabetes after the exclusion of other causes." (Hicks, *et al.,* 2019) Peripheral neuropathy is a common complication of diabetes, but it is often underdiagnosed due to its insidious onset and lack of awareness among patients and healthcare providers. By studying peripheral neuropathy in diabetic patients, it can be highlighted the need for early detection and intervention. Tertiary level hospitals are vital centers for managing complex healthcare issues. However, there is a notable lack of comprehensive data on peripheral neuropathy in diabetic patients attending these facilities in Bangladesh. The worldwide increase in the incidence of diabetes especially in the developing world and its most frequent complication; diabetic neuropathy call for public health interventions focusing on risk factors that are easily reversible at this juncture. In case the positive and effective intervention strategies are not adopted, the future reports reveal that by 2050 one third of the global population of the world estimated at 9.7 billion will be affected by diabetes and half of them will develop neuropathy (Feldman *et al.,* 2019). The effects on people as well as on the society in terms of lost resources and productivity are immeasurable. This particular challenge needs to be addressed to improve the quality of patient care outcomes greatly. In order to do this, the present study proposed to evaluate the prevalence of peripheral neuropathy among diabetic patients attending the outpatient department of a tertiary level hospital in Bangladesh.

METHODOLOGY

A cross-sectional study in the outpatient department (OPD) of Dhaka medical college and hospital, Sir Salimullah Medical College Mitford Hospital and BIRDEM General Hospital, Dhaka. from January 2022 to January 2023. The inclusion criterion was adult patients with age ≥ 18 years, both male and female and suffering from diabetes more than 6 months and patients who were pre-diagnosed as type-2 diabetes mellitus by the physician. The exclusion criteria were any known rheumatic disease, vitamin B12 deficiency, alcoholism, drug-abuse, hypothyroidism, paraneoplastic disorders, cerebral vascular disease, Parkinsonism, uremia and acute or chronic musculoskeletal disorders.

In the study of Hicks, *et al.,* diabetic peripheral neuropathy (DPN) affects 6% to 51% of patients with diabetes (Hicks, *et al.,* 2019). For this study 50% was considered as desired prevalence and sample size was found 403 considering response and non-response from the participants. Detailed face-to-face interviews were conducted using a semi-structured interview questionnaire (translated into Bengali using the standard forward and back-translation procedures) which was comprised of close-ended questions based on the objectives of the study. Data were collected in collaborative help of patients and doctors with the permission of authority and then entered, checked and scrutinized by the principal investigator. The socio-demographic characteristics of participants were collected along with other relevant information. All data were analyzed with SPSS version 26. Eligibility of each case was assessed and identified in every respondent was asked for informed written consent. Confidentiality of the patients (subjects) about personal information was strictly maintained

RESULTS

This chapter outlines the socio-demographic profile, medical history, baseline clinical characteristics and neuropathy severity score (NSS) of the study participants. It also highlights the association between socio-demographic status and medical history of DM patients with peripheral neuropathy using inferential statistics.

A total of 403 participants were included in the study. The mean age of the participants' (range 22 to 77 years) was 50.92±10.56. Most of the respondents were between 60-69years (29%) followed by 40-49 years (28.8%). Majority of the participants were female (N=209, 51.9%). Most of the study participants (54.5%) were educated up to the secondary level, whereas only 7.2 % were graduated/post graduated. About two-third of the participants (57.0%) in the study were Muslims. Majority of the participants in the study were married (79.4%). Desk job was represented by the majority of study participants (47.6%), followed by the Heavy work by hand (24.6%).

Table 1: Socio demographic characteristics

Variable	Frequency(n=403)	Percentage (%)
Age (Years)		
20-29	4	1.0
30-39	72	17.9
40-49	116	28.8
50-59	76	18.9
60-69	117	29
>70	18	4.5
Mean (SD)	50.92±10.56	
Gender		
Male	194	48.1
Female	209	51.9
Religion		
Islam	301	74.7
Hindu	100	24.8
Buddhist	2	0.5
Education		
Illiterate	54	13.4
Primary	112	27.8
Secondary	182	45.2
HSC	26	6.5
Graduate/post graduate	29	7.2
Marital status		
Unmarried	4	1.0
Married	320	79.4
Widow	31	7.7
Widower	10	2.5
Divorce	38	9.4
Type of work		
Desk job	192	47.6
Heavy work by hand	99	24.6
Heavy lifting job	91	22.6
Leaning forward work	21	5.2

The medical history of the diabetic patients under follow-up in the table 2 reveals important trends regarding disease duration and control. The majority of patients (60.5%) have been living with diabetes for 2-5 years, while 29% have had the disease for less than 2 years, and 10.4% for more than 5 years. In terms of diabetes management, a significant proportion of the patients (64%) have uncontrolled diabetes, while only 36% have achieved control over their condition.

Table 2: Medical history of DM patients under follow up in clinics

Variable	Frequency(n=403)	Percentage (%)
Duration of diabetes		
<2 years	177	29.0
2-5 years	244	60.5
>5 years	42	10.4
Status of diabetes mellitus		
Controlled	145	36.0
Uncontrolled	258	64.0

In the table 3, the baseline characteristics of the diabetic patients highlight key health metrics. The mean Body Mass Index (BMI) was 25.26±2.86 kg/m², with nearly half of the participants being overweight (48.1%), and a smaller proportion classified as obese (6.5%). The average weight and height of the participants were 65.10±7.71 kg and 160.59±5.65 cm, respectively. Blood pressure levels were within a similar range, with an average systolic blood pressure (SBP) of 133.69±16.15 mmHg and diastolic blood pressure (DBP) of 82.92±13.54 mmHg. The average HbA1c level, a measure of long-term glucose control, was elevated at 8.22±1.01%, indicating poor glycemic control.

Additionally, triglyceride levels were high, with a mean value of 300.07±66.13 mg/dL.

Table 3: Baseline characteristics of the study population/ of diabetic patients under follow-up in clinics

Variable		Frequency(n=403)	Mean + SD =
BMI category	Normal	183 (45.4%)	25.26±2.86
	Overweight	194 (48.1%)	
	Obese	26 (6.5%)	
Weight(kg)			65.10±7.71
Height(cm)			160.59±5.65
SBP(mmHg)			133.69±16.15
DBP(mmHg)			82.92±13.54
HbA1C(%)			8.22±1.01
Triglyceride(mg/dl)			300.07±66.13

According to neuropathy severity score, no neuropathy was found in 208 out of 403 respondents (51.6%). Among rest of the respondents with peripheral neuropathy, 97(24.1%) respondents had mild NSS, 69(17.1%) had moderate NSS and 29(7.2%) had severe NSS showed in table-4.

Table 04: Neuropathy severity score (NSS) severity reported by patients (n=403)

Variable	Frequency(n=403)	Percentage (%)
No neuropathy	208	51.6
Mild NSS	97	24.1
Moderate NSS	69	17.1
Severe NSS	29	7.2
Total	**403**	**100%**

The association between socio-demographic status, medical history, and peripheral neuropathy among diabetic patients can be observed from the table 5. There was no statistically significant difference in the prevalence of peripheral neuropathy based on age group (p=0.827) or sex (p=0.567), indicating that neither factor plays a significant role in the development of neuropathy in this study. However, the duration of diabetes mellitus (DM) showed a strong association with peripheral neuropathy (p=0.001), with a higher prevalence in those having diabetes for 2-5 years (68.2%) and over 5 years (11.8%) compared to those with less than 2 years of diabetes (20%). Additionally, uncontrolled diabetes was significantly associated with peripheral neuropathy (71.3% of patients with neuropathy had uncontrolled DM, p=0.003).

Table 5: Association between socio-demographic status and Medical history of DM patients with peripheral neuropathy (n=403)

Variable	Peripheral neuropathy		p value
	Yes f(%)	No f(%)	
Age group			**0.827**
< 50 year	94(48.2)	98(47.1)	
>50 year	101(51.8)	110(52.9)	
Sex			**0.567**
Male	91(46.7)	103(49.5)	
Female	104(53.3)	105(50.5)	
Duration of diabetes mellitus			**0.001**
<2 years	39(20)	78(37.5)	
2-5 years	133(68.2)	111(53.4)	
>5 years	23(11.8)	19(9.1)	
Status of DM			**0.003**
Controlled	56(28.7)	89(42.8)	
Uncontrolled	139(71.3)	119(57.2)	

The association between clinical parameters and peripheral neuropathy among diabetic patients, as presented in Table 6 shows that patients with peripheral neuropathy had a significantly higher Body Mass Index (BMI) (25.75±2.65 kg/m²) compared to those without neuropathy (24.81±2.98 kg/m²), with a p-value of 0.001, indicating a strong association between higher BMI and the occurrence of peripheral neuropathy. Similarly,

HbA1c levels, a marker of long-term blood sugar control, were notably higher in the neuropathy group (8.48±0.78%) compared to the non-neuropathy group (7.98±1.13%), with a highly significant p-value of <0.001, suggesting that poor glycemic control is strongly linked to the development of peripheral neuropathy. Triglyceride levels were also significantly elevated in patients with neuropathy (318.79±46.28 mg/dL) compared to those without (282.52±76.45 mg/dL), with a p-value of <0.001, indicating a clear association between elevated triglycerides and neuropathy. However, systolic (SBP) and diastolic blood pressure (DBP) showed no significant difference between the two groups, with p-values of 0.786 and 0.703, respectively.

Table 6: Association between clinical parameters with peripheral neuropathy (n=403)

Variable	Peripheral neuropathy		p value
	Yes f(%)	No f(%)	
BMI(kg/m2)	25.75±2.65	24.81±2.98	**0.001**
SBP(mmHg)	133.92±15.94	133.48±16.39	**0.786**
DBP(mmHg)	82.85±14.56	82.29±14.52	**0.703**
HbA1C(%)	8.48±0.78	7.98±1.13	**<0.001**
Triglyceride(mg/dl)	318.79±46.28	282.52±76.45	**<0.001**

*Independent t test was done.

DISCUSSION

The findings of this paper underscore an important issue of peripheral neuropathy (PN) in diabetic patients and its relation to patient demographics and disease characteristics. Diabetes mellitus (DM) is a long-term health condition which impacts individuals, families and societies in almost every region in the world. DPN is one of the most common microvascular complications in that a patient with DM is likely to develop several associated medical conditions including severe pain, disability and early mortality. The assessment of the proportion of DPN among diabetic patients, as conducted in this study, was assumed to be essential for informing healthcare interventions and managing diabetic complications.

The respondents in the study comprised a diverse population and had an average age of 50.92±10.56 years. The largest shares belonged to the respondents aged 60-69 (29%) and 40-49 (28.8%). These age groups fall in line with what was prepared before by Latif *et al.,* (2020) where the mean age was 51.3±11.02 years and Munyambalu *et al.,* (2023) where the mean age was 59.4±14.6 years. Also, in terms of gender distribution, female subjects were higher, with 51.9 %, a situation which is similar to other carried out research studies. For instance, Munyambalu *et al.,* (2023) established a greater percentage of female participants (F = 61.8%). The variations in age and gender of patients with diabetes realized from these studies imply that there is an agreement in the demographic behaviour of diabetic patients most especially those prone to develop DPN.

Another invariant pointed out in this study was the body mass index (BMI). The greater part of the respondents was either overweight or obese, the levels being 48.1% and 6.5% respectively. High BMI has long been associated with an increased risk of diabetes and its complications. It is evident that a high BMI poses an increased risk of diabetes and other health-related conditions. Chowdhury *et al.,* (2022) established a direct correlation between BMI and diabetes in the subsequent probability of predicting diabetes in adults; in the year 2011, overweight and obese adult patients were 54% and 51% likely to develop diabetes and 22% and 44% more likely in 2018. These findings are crucial because they indicate that higher BMI may not only predispose individuals to DM but may also exacerbate complications like DPN.

In this study, a high diabetic peripheral neuropathy (DPN) rate of 48.4% was revealed as a significant result. This proportion is in line with other research findings although slight differences are observed due to geographical and population density. The authors Hicks *et al.,* (2019) provided that the global incidence of DPN among diabetic patients was between 6 and 51% which depends on some potential factors such as age, duration of diabetes, glycemic control, and type of diabetes mellitus that is supported by the present study's result. However, Battula *et al.,* (2017) described a higher prevalence of DPN, 60.4%, and Munyambalu *et al.,* (2023) observed even a higher prevalence of 65.8%. Such a difference attributed to factors like different individuals are likely to have different lifestyle, geographical location, and, most importantly, different healthcare systems. Haque *et al.,* (2023) found a lower rate of 36.84% in Bangladesh that could be due to sample size difference and access to health care facility.

The respondents' condition was also evaluated according to the severity of neuropathy, where 24.1% of the respondents had mild neuropathy,17.1% had moderate neuropathy and 7.2% had severe neuropathy. Such findings are similar to other works such as Lee *et al.,* (2022) which revealed mild, moderate, and severe DPN in 17.3%, 8.2%, and 1.1% of the subjects studied respectively. Contrary to the findings above, Munyambalu *et al.,* (2023) reported a higher proportion of severe cases and assessed the severity through a neuropathic questionnaire reporting that 12.8% of participants had severe neuropathy. These differences

could be attributed to variations in the duration of diabetes, age, and healthcare services of the involved populations in the two studies.

Interestingly, there are no significant relationship between sociodemographic index including education, marital status and religion and peripheral neuropathy in this study. But, the type of diabetes and glycemic control as measured by HbA1c levels were established to predict DPN duration. It was established that the majority of the identified patients with DPN have diabetes for not less than 2 years, the breakdown being 68.2% of patients with DPN having diabetes for 2-5 years while 11.8% of the patients have had diabetes for more than 5 years. This is consistent with other researchers who have argued that the proportion of DPN increased from 8% to 42% from the year of onset to 10 10-year follow-up period, according to Hossain *et al.,* (2022).

Also, the present study revealed that other diagnosed medical conditions that had a strong relationship with DPN comprised uncontrolled diabetes. According to the DPN, 71% of the respondents had uncontrolled diabetes expressed by the raised HbA1c level. This finding is in line with the one postulated by Hossain *et al.,* (2022) but these scholars found a comparatively lower proportion (30.4%) of patients with diabetes who had controlled DM. Similarly, the close relationship between poor glycemic control and DPN makes it important for diabetic patients to manage diabetes to help prevent the development, in addition to the progression, of neuropathy.

Last, there were significant differences in clinical measurements including BMI ($p<0.001$), HbA1c ($p=0.014$), and triglyceride levels ($p<0.001$) between the DPN respondents and the non-DPN respondents. The results of the present study are similar to those of Lee *et al.,* (2022), who highlighted that increased HbA1c levels were predictive of DPN development. On the other hand, Latif *et al.,* (2020) did not include triglyceride level as a significant factor, and this study revealed that patients with higher triglyceride level were significantly associated with peripheral neuropathy, meaning that metabolic control is very important in the management of DPN.

CONCLUSION

This study emphasizes the need for better identification and efficient multimodal treatment of diabetic peripheral neuropathy. The results support the necessity of systematic examination of diabetic patients, especially those with a poor glycemic control and increased BMI. Thus, life style changes in glycemic control, weight management and overall metabolic health are critical for the prevention of the progression of DPN. The primary management of this life worsening diabetes complication includes timely diagnosis and adoption of correct dietary and exercising habits.

Author Contributions

1. Conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: MMK.
2. Drafting the work or reviewing it critically for important intellectual content: PSP.
3. Final approval of the version to be published: MMK, PSP.
4. Accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: MMK, PSP.

ACKNOWLEDGEMENT

The completion of this research paper would not have been possible without the support and guidance of Dhaka Medical College Hospital, Sir Salimullah Medical College, BIRDEM Hospital. The encouragement and insightful feedback were instrumental in accomplishing this task.

Conflict of Interest: We do not have any conflict of interest.

Funding: None.

REFERENCES

- Abbott, Caroline A., Chaturvedi, N., Malik, R. A., Salgami, E., Yates, A. P., Pemberton, P. W., & Boulton, A. J. M. (2010). Explanations for the lower rates of diabetic neuropathy in Indian Asians versus Europeans. Diabetes Care, 33(6), 1325–1330. https://doi.org/10.2337/dc09-2067
- Abbott CA, Chaturvedi N, Malik RA, Salgami E, Yates AP, Pemberton PW, Boulton AJ. and pacific islanders in the US: The diabetes study of northern california (DISTANCE) DiabetesAnon 2008. Statement of retraction. *Autoimmunity*, 41(3), 241.
- Battula, P., Afreen, S., Meena, E., Reddy, S.S.R. & Sujatha, G., 2017. Prevalence of sensory peripheral neuropathy in diabetic patients at diabetes care centre: a cross sectional study. *International Journal of Research in Medical Sciences*, 5(9), 4066. https://doi.org/10.18203/2320-6012.ijrms20173984
- Callaghan, B.C., Cheng, H., Stables, C.L., Smith, A.L. & Feldman, E.L., 2012. Diabetic neuropathy: Clinical manifestations and current treatments Brian. *Lancet Neurol*, 11(6), 521–534. DOI: 10.1016/S1474-4422(12)70065-0
- Feldman, E. L., Callaghan, B. C., Pop-Busui, R., Zochodne, D. W., Wright, D. E., Bennett, D. L., Bril, V., Russell, J. W., & Viswanathan, V. (2019). Diabetic neuropathy. Nature reviews. Disease primers, 5(1), 42. https://doi.org/10.1038/s41572-019-0097-9
- Haque, M.S., Enu, Y.A., Shahriar, M.M. & Jor, A., 2023. Foot Complications and Footwear Habits: A Study of Diabetes Mellitus Patients in Bangladesh. *Journal of Engineering Science*, 14(1), 77–83.

https://doi.org/10.3329/jes.v14i1.67637

- Harris, M. I., Klein, R., Welborn, T. A., & Knuiman, M. W. (1992). Onset of NIDDM occurs at Least 4–7 yr Before Clinical Diagnosis. *Diabetes Care*, *15*(7), 815–819. https://doi.org/10.2337/diacare.15.7.815
- Hicks, et al, M., 2019. Epidemiology of Peripheral Neuropathy and Lower Extremity Disease in Diabetes. *Curr Diab Rep.*, 176(3), 139–148. PMID: 31456118, DOI: 10.1007/s11892-019-1212-8
- Hossain, M.B., Khan, M.N., Oldroyd, J.C., Rana, J., Magliago, D.J., Chowdhury, E.K., *et al.,* 2022. Prevalence of, and risk factors for, diabetes and prediabetes in Bangladesh: Evidence from the national survey using a multilevel Poisson regression model with a robust variance. *PLOS Global Public Health*, 2(6), e0000461. https://doi.org/10.1371/journal.pgph.0000461
- Kanaya, A. M., Adler, N., Moffet, H. H., Liu, J., Schillinger, D., Adams, A., Ahmed, A. T., & Karter, A. J. (2011). Heterogeneity of diabetes outcomes among asians and pacific islanders in the US: the diabetes study of northern california (DISTANCE). Diabetes Care, 34(4), 930–937. https://doi.org/10.2337/dc10-1964
- Kasim, K., Amar, M., Sadek, A. a. E., & Gawad, S. A. (2009). Peripheral neuropathy in type-II diabetic patients attending diabetic clinics in Al-Azhar University Hospitals, Egypt. International Journal of Diabetes Mellitus, 2(1), 20–23. https://doi.org/10.1016/j.ijdm.2009.10.002
- Latif, Z.A., Gadekar, A.V., Ashrafuzzaman, S.M., Amin, M., Sobhan, M.J. & Haider, T., 2020. A cross-sectional study to evaluate diabetes management, control and complications in 1631 patients with type 2 diabetes mellitus in Vietnam (DiabCare Asia). *International Journal of Diabetes in Developing Countries*, 40(1), 70–79. DOI:10.1007/s13410-019-00755-w
- Lee, P.Y., Salim, H.S., Cheng, Y.G., Zainuddin, Z., Singh, H. & Loh, K.W., 2022. The proportion of undiagnosed diabetic peripheral neuropathy and its associated factors among patients with T2DM attending urban health clinics in Selangor. *Malaysian Family Physician*, 17(1), 36–43. DOI: 10.51866/oa1297
- Lehmann, H.C., Wunderlich, G., Fink, G.R. & Sommer, C., 2020. Diagnosis of peripheral neuropathy. *Neurological Research and Practice*, 2(1). DOI: 10.1186/s42466-020-00064-2
- Munyambalu, D.K., Hildago, I., Bafwa, Y.T., Lagoro, C.A., Sikakulya, F.K., Vahwere, B.M., *et al.,* 2023. Prevalence and grade of diabetic peripheral neuropathy among known diabetic patients in rural Uganda. *Frontiers in Clinical Diabetes and Healthcare*, 3(January), 1–8. PMID: 36992747
- Ray, J., Sahoo, C.K., Mohanty, R., Sahoo, R. & Dalai, R., 2021. A Review on Diabetic Peripheral Neuropathy. *Journal of Drug Delivery and Therapeutics*, 11(2-S), 121–125. DOI:10.22270/jddt.v11i2-S.4642
- Shobana R, Augustine C, Ramachandran A, Vijay V. *Improving psychosocial care: The Indian experience. Diabetes Voice. 2005;50(1):19–21.* DOI:10.1016/j.dsx.2007.05.006
- World Health Organization: WHO & World Health Organization: WHO. (2023, April 5). *Diabetes*. https://www.who.int/news-room/fact-sheets/detail/diabetes