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Research Paper

Assessing Diabetic Peripheral Neuropathy: Prevalence and Risk Factors through the Diabetic Neuropathy Symptom Score in a Hospital Setting

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ABSTRACT

Introduction: Diabetes Mellitus (DM) is emerging as a major health problem owing to its serious complications. Within India, inter-regional disparities in burden of type 2 diabetes mellitus (T2DM) are expected because of varying lifestyles and demographic patterns.

Material and Methods: A cross sectional study was conducted to find out the prevalence and risk factors for diabetic peripheral neuropathy in T2DM individuals of age above 30 years visiting Index Medical College and Hospital, Indore, Madhya Pradesh. 400 participants having type 2 diabetes participants were enrolled in the study. Participants identified as T2DM were screened and assessed by using diabetic Neuropathy symptom scoring system (DNS) to identify the presence of diabetic peripheral neuropathy.

Results: Overall prevalence of DPN was found to be 48.57%. Prevalence was increase with advancement of age, more than 60 years of age (88.38%). Male's had higher prevalence (79.01%) as compare to female participants (68.60%). Age, diet, BMI, truncal obesity, smoking, alcohol consumption and family history of diabetes appear to increase the risk for developing DPN. Furthermore, advance age and duration of diabetes appear to be risk factors fordeveloping DPN in the T2DM participants.

Conclusion: High prevalence of DPN, in the study area, suggests the impact of socioeconomic transition on the occurrence of the disease**.** Diabetic Neuropathic Examination score and Diabetic Neuropathy symptom score can be used as screening tools for assessment of DPN in community settings. There is need to institute screening and awareness programs for early detection of diabetic complication so as to prevent long term consequences. The findings of this study suggest the need for the promotion of preventive measures to prevent or delay the development of chronic complications of diabetes through good glycaemic control, regular monitoring, lifestyle modification, practice of exercise and yoga to maintain the normal balance of sympathetic and parasympathetic tone.

Key words: autonomic function tests; type 2 diabetes mellitus; diabetic peripheral neuropathy; autonomic dysfunction; diabetic symptom score; diabeticneuropathy examination score.

INTRODUCTION:

DM is also well known for the microvascular complications as tripathy includes diabetic neuropathy, retinopathy and nephropathy. Diabetic retinopathy can lead to visual symptoms including reduced vision and potential blindness. Diabetic nephropathy occurs due to impact of diabetes on the kidneys which can lead to loss of small or progressively larger amounts of protein in the urine. It causes chronic kidney disease which may require dialysis. Another important and common clinical complication of diabetes is diabetic neuropathy (DN).[1-5] DN is a heterogeneous disorder that encompasses a wide range of abnormalities affecting both proximal and distal peripheral sensory and motor nerves as well as the autonomic nervous system. Primary symptoms of DN include numbness, tingling and pain in the feet and it may also increase the risk of skin damage due to altered sensation. DN can also affect all the organ systems in the body including gastrointestinal tract, urogenital tract & cardiovascular system. Further, together with vascular disease in the legs, neuropathy contributes to the risk of diabetes related foot problems such as diabetic foot ulcers which is difficult to treat and occasionally it may require amputation. Factors involved in the pathogenesis of DN are altered metabolism, vascular insufficiency,loss of growth factor tropism and autoimmune destruction of nerves in the visceral and cutaneous distribution.[6-10] DN is among the least recognized and understood complications of diabetes despite its significant negative impact on survival andquality of life. Most common clinical form of DN is diabetic autonomic neuropathy (DAN) and diabetic peripheral neuropathy (DPN). DAN affects the nerves that control the heart rate, blood pressure, blood glucose response and other internalorgans. This will cause the problems with digestion, respiratory function, urination, sexual response and vision. It also affects the system which restores blood glucose levels to normal after a hypoglycemic episode resulting in loss of the warning signs ofhypoglycemia, such as sweating and palpitations.[11-17]

Diabetic peripheral neuropathy (DPN) is a common complication estimated to affect 30% to 50% of individuals with diabetes. Chronic sensorimotor distal symmetric polyneuropathy is the most common form of DPN. Epidemiological data indicates that the prevalence of DPN is higher in type 2 than type 1 diabetes. Kastenbauer et al had observed an evidence of peripheral neuropathy in nearly one third of patients with T1DM and more than half of patients with T2DM.[26] However, another population-based cohort studies have shown that 66% of T1DM and 59% of T2DM had objective evidence of DPN.[17-26]

Although neuropathy has long been recognized as a complication of diabetes, the impact of this condition has not been adequately established. The prevalence of DPN is virtually unknown because the published studies differ considerably regarding definition, method of assessment and patient selection, despite being considered one of the most common long-term complications of diabetes. DPN has a slow and insidious onset which may be responsible for the problem of awareness of this condition in the patient and hence patients may suffer from the condition unknowingly for many years. Early diagnosis and intervention are of prime importance in preventing potentially serious consequences of diabetic complications.[25, 26,] Also, there are not many studies reporting the prevalence and risk factors of DPN. Hence, the present study was carried out to estimate the prevalence and risk factors of DPN among T2DM individuals.

METHODOLOGY

Study design: A community based cross-sectional study.

Study Setting and duration: The study was carried out at Index Medical College and Hospital from Dec.2022 to. Dec.2023

Ethics approval: The study was approved by the Index Medical College and Hospital Institutional Ethics Committee. Voluntary Informed consent was taken from all participants before enrolling into thestudy.

Inclusion criteria:

- Individuals of age 30 years and above.
- Individuals with symptoms of T2DM.
- Known cases of T2DM (FBG ≥ 126mg/dl).

Exclusion criteria:-

- Individuals who declined to provide informed consent.
- Pregnant women / who had delivered a baby weighing ≥ 4.5Kg / womenwho had gestational diabetes.
- Individuals with T1DM.
- Individuals with cognitive, neurological, psychological and endocrinal disorders.
- Individuals with congenital heart diseases.

Sample Size:

- The sample size was calculated based on reported prevalence is being 39.3% that are geographically and socio-culturally like the study area.Considering absolute error of 5% with 95% confidence level, the sample size was estimated to be 382.[26,27]

Personal details and History [28-31]:

- **Literacy and occupation status:** The participants were interviewed with a pre- designed questionnaire / investigation proforma (Annexure-III) regarding identification, demographic details, behavioral components, social and biological variables.
- **Literacy: -** Education was classified based on International Standard Classification of Education (UNSCO, 1997). Literacy was categorized as Illiterate, Primary school education, Secondary school education, Graduates and above. [278]
- **Occupation: -** The occupation of study participant was classified as workers and non-workers as per census of India 2001. Further workers were subdivided based on their occupation such as Skilled-I to Skilled – (Govt. of India Report, 2004).[279,280]
- **Workers:** Skilled-I: Agriculture, Skilled II: Laborer, Skilled III: Associate professional (Self Employee), Skilled IV: Higher professionals (Govt employee)
- **Non workers:** Homemaker and Elderly persons (who are notinvolved in active working)
- **Smoking and alcohol:** Smoking pattern such as smokers and nonsmokers was noted. The alcohol consumption pattern of alcoholic and nonalcoholic was noted.

Family History of Diabetes [32]

- Detailed family history of T2DM was taken. This was verified eitherby blood glucose measurement of the parents or in the person'sabsence, by other circumstantial evidence

(physician report, diet modifications, consumption of drugs).

- Known cases of T2DM were included in the study. Duration ofdiabetes and medication details was noted.
- In the present study, if the response was "diabetes status of parents not known", it was assumed to be "No family history of DM.

Anthropometrical Measurements [33-38]

i. **Weight (Kg):** Weight was recorded by using a standard weighing scale (Krups weighing scale) that was kept on firm horizontal surface. Weight was recorded to the nearest 500gms.

ii. **Height (cm):** Height was recorded using a measuring tape to the nearest 1 cm. participants were requested to stand upright without shoes with their back against the wall, heels together and looking forward.

iii. **Body mass index (BMI)**:- BMI was recorded using Quetelet's equation.
[Weight (kg)/height (m^2)].[33-34]
Classification of BMI :- $\leq$ 18.9 kg/m^2 – Underweight, 19-24.9 kg/m^2 – Normal, 25-29.9 kg/m^2 – Pre-obese (overweight) and $\geq$ 30kg/m^2 – Obese

iv. **Waist circumference (cm)** : Waist circumference was measured to the nearest 0.1 cm at the mid-point between the costal margin and iliac crest using a non-stretchable measuring tape, at the end ofnormal expiration with the participant standing erect in relaxed position, feet 25-30 cm apart.[35-38]

v. **Hip circumference (cm):-** Hip circumference was measured at the level of greater trochanters (widest position of hip) to the nearest 0.1cm with a measuring tape, while the participant was standing withthe arms by side and feet together.

vi. **Waist-Hip ratio: -** Waist-Hip ratio was calculated as the ratio of waist circumference and hip circumference.[35-38]

vii. **Central Obesity: -** Central/abdominal obesity was considered to be present when waist circumference $\geq$ 90 cm in males and $\geq$ 80 cm in females.[40]

viii. **Truncal obesity:-** Waist-Hip ratio of > 1.0 for males and > 0.85 for females was defined as truncal obesity.[40]

Blood pressure measurement (mmHg)

- Blood pressure was measured in the left arm in sitting posture, with the participant in a relaxed state. Standardized mercury sphygmomanometer (Diamond deluxe BP apparatus, Pune India) with adult size cuff was used. The first appearance of (phase I of Korotkoff sounds) sound was used to define systolic blood pressure (SBP). The disappearance of sound(phase 5) was used to define diastolic blood pressure (DBP). Study participant was considered to be hypertensive if he/she was an already diagnosed case of hypertension and /or on treatment or with a currentSBP of > 140 mmHg or DBP > 90 mmHg (as per JNC VII criteria). [41]

Tests for assessment of Diabetic Peripheral Neuropathy (DPN) [42]

1. **Diabetic Neuropathy Symptom Score (DNS):**

Subjects were instructed about the test. Subject was questioned regarding the presence or otherwise of symptoms, either positive or negative suggesting the presence of neuropathy. The questionnaire was the DNS score which was an adapted version of the earlier version- Neuropathy symptom score (NSS). The questions should be answered "yes" (positive - 1 point) if a symptom occurred more times a week during the last 2 weeks or "no" (negative- no point) if did not.

The DNS score has the following items: (i) unsteadiness in walking, (ii)pain, burning or aching at legs or feet, (iii) prickling sensations in legs or feet, and (iv) numbness in legs or feet. Presence is scored 1, absence 0, maximum score 4 points. 0 - absence of polyneuropathy and 1-4 indicated presence of polyneuropathy.

Diabetic Neuropathy Examination Scores (DNE):

Subjects were instructed about the procedure and test. This score was based on a thorough neurological examination, similar to its earlier version- the Neuropathy Disability Score (NDS). The DNE score consisted of eight items, two testing muscle strength, one tendon reflex and five sensations. The maximum score is 16. A score of > 3 points is considered abnormal.

Muscle strength: quadriceps femoris, tibialis anterior, reflex: ankle reflex, sensation:-pinprick sensitivity, touch sensitivity, vibration perception and joint position sensation was tested. Only the right leg and foot was tested.

The scores for each item include 0 - normal and 1 - mild/moderate deficit; muscle strength: MRC scale 3-4; reflex: decreased but present; sensation: decreased but present and 2- severely disturbed/ absent; reflex- absent; sensation- absent. Maximum score was 16 points. A score of > 3 indicated presence of polyneuropathy.

Statistical analysis: Data analysis was done by using Software Package of Social Sciences (SPSS) trial version 16. Differences were considered significant at $P \leq 0.05$ level with confidence interval of (CI) 95%. Descriptive statistics, chi-square test for association and regression analysis for estimation of risk factors was used in the study

RESULTS

Of the 385 screened participants (mean age of 52.26±8.84 years), majority belonged to age group of 40-49 year (31.94%), ≥ 60 years (40.25%) and 50-59 years (20.77%) whereas the participants with age group of 30-39 years constituted a very less portion (7.2 %). There were more females (57.92%) than males. Nearly half (42.85%)of the participants were illiterate and around one thirds of them (22%) had Primary school education while very few had completed primary school education (17%) and graduation (23%). (Table 4.1.2) Majority of participants were farmers (Skilled I –46.75%) and not involved in active work (Housewives and older people – 23.37%). Majority were consuming mixed diet (79.22%). Nearly two-thirds of the participants were overweight (35%) and nearly half of them had both central and truncal obesity (63.63.2%). Among the males, approximately half of the participants were smokers (44.9%) and alcoholics (69.13%). Nearby, three fourth of the participants had family history of diabetes (63.09.4%). (Table 1-4)

The mean Age (P =0.002), Weight (P<0.001), BMI (P <0.001), SBP (P<0.001) and Fasting blood sugar (P <0.001) were significantly higher in T2DM participants as compared to non-diabetics. (Table 5)

Table 1: Distribution of study participants by age and gender

Characteristics	Category	Total number	Percentage
Age (in years)	30-39	50	13.08
	40-49	177	46.33
	50-59	65	17.01
	≥60	90	23.56
Gender	Male	138	36.12
	Female	244	63.87
	Total	382	100
Mean age : 52.26±8.84 years			

Table 2: Distribution of study participants according to literacy status and occupation

Characteristics	Category	Total number	Percentage
Literacy	Illiterate	165	42.85
	Primary school	85	22
	Secondary school	75	19.48
	Graduation and	60	15.58
	Above		
Occupation	Skilled I	180	46.75
	Skilled II	40	10.3
	Skilled III	25	6.49
	Skilled IV	50	12.98
	Non workers	90	23.37
	Total	**385**	**100**

Table 3: Distribution of study participants by diet pattern, BMI, central and truncal obesity

Characteristics	Category	Total number	Percentage
Diet	Veg	80	20.77
	Mixed diet	305	79.22
BMI	≤18.5-18.9	6	1.5
Mean BMI	19-24.9	80	20.77
(25.10±3.83)	25-29.9	145	37.66

	≥30	154	40
Central obesity	Yes	198	51.42
	No	187	48.57
Truncal obesity	Yes	178	46.23
	No	207	53.70
	Total	**385**	**100**

Table 4: Distribution of study participants by smoking habits, alcohol consumption and family history of diabetes

Characteristics	Category	Total number	Percentage
Smoking	Yes	212	55
	No	123	44.9
Alcohol	Yes	223	57.92
	No	162	42.07
Family History of	Yes	133	34
DM	No	252	65.65
	Total	**385**	**100**

Table 5: Comparison of anthropometric & biochemical variables betweendiabetic and non-diabetic participants

Variable	Category	Mean ± SD	P value
Age*	Non-diabetic	53.02±8.5	0.001*
	T2DM	55 .43±8.5	
Height	Non-diabetic	157.4±8.1	< 0.001*
	T2DM	153.8±8.2	
Weight*	Non-diabetic	57.6±7.8	< 0.001*
	T2DM	68.27±8.4	
BMI*	Non-diabetic	25.43±3.2	< 0.001*
	T2DM	29.25±4.5	
Waist-Hip Ratio	Non-diabetic	0.87±0.06	0.075
	T2DM	0.98±0.07	
FBS*	Non-diabetic	99.2±11.4	< 0.001*

	T2DM	135.2±37.1	
SBP*	Non-diabetic	120.4±10.5	< 0.001*
	T2DM	130.0±13.2	
DBP	Non-diabetic	85.7±5.5	0.390
	T2DM	86.5±8.4	

***Significantly higher among T2DM participants (P < 0.05)**

Prevalence of DPN

Overall prevalence of the diabetic peripheral neuropathy in the study area was 48.57%. (Figure 1)

Association between sociodemographic, anthropometric potential risk factors and prevalence of DPN

The age of the participants showed significant association with prevalence of DPN (P < 0.001). Prevalence of DPN was higher in the age group of ≥ 60 years (88.38%) and 50-59 years (78.75%) than other age groups. Males had slightly higher prevalence of DPN than females (79.01 Vs 68.60%), which was significantly associated with prevalence of DPN (P = 0.003). There was significant relationship between alcoholics and prevalence of DPN. In addition, Alcoholics had higher prevalence (66.4% Vs 55%) than non-alcoholics. Participants with smoking, family history of diabetes, mixed diet, overweight and with truncal obesity did not showed any significant differences in the prevalence of DPN. Prevalence of DPN increased significantly with increase in the duration of diabetes (P < 0.001), being highest in the participants with duration of diabetes >11 years (95.71%) and 6-10 years (93.51%). (Figure 2, 3; Table 6, 7)

Risk factors of DPN

Prevalence of DPN increases significantly with increase in the duration of diabetes. (P < 0.001) Participants with duration of diabetes ≥ 11 years, 6-10 years and ≤ 5 years had 825.120 fold, 480.878 fold of higher chance of developing DPN respectively than short term diabetes. (Table 8)

Figure 1: Prevalence of DPN in the study area

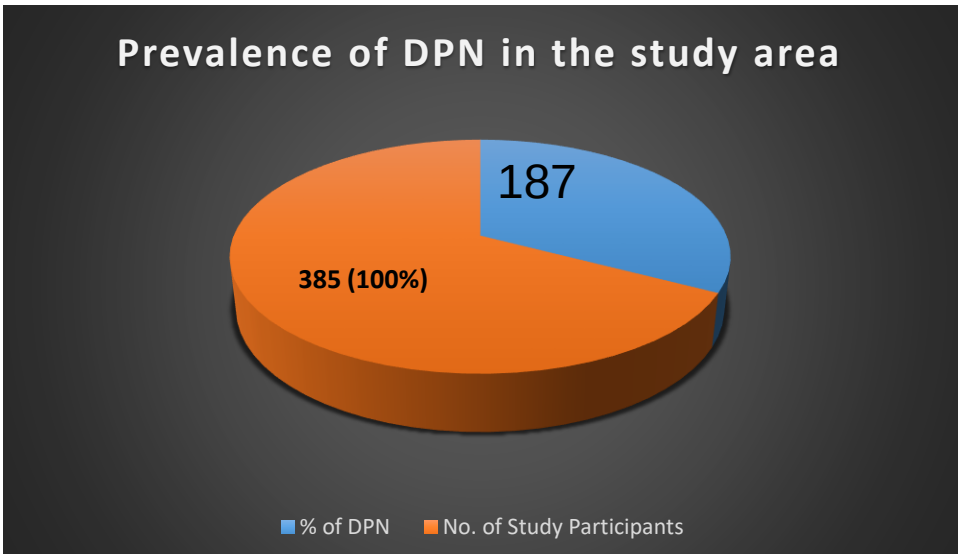

Figure 2- Prevalence of DPN with Age groups

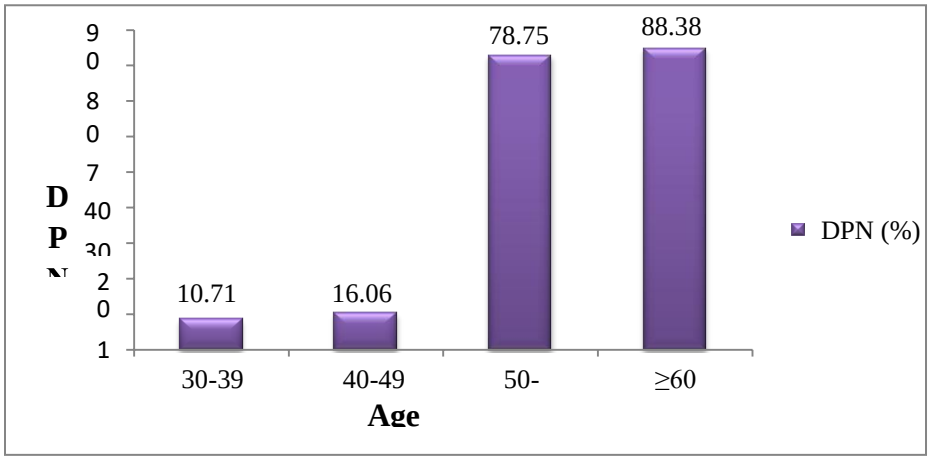

Figure 3: Prevalence of DPN with respect to duration of diabetes

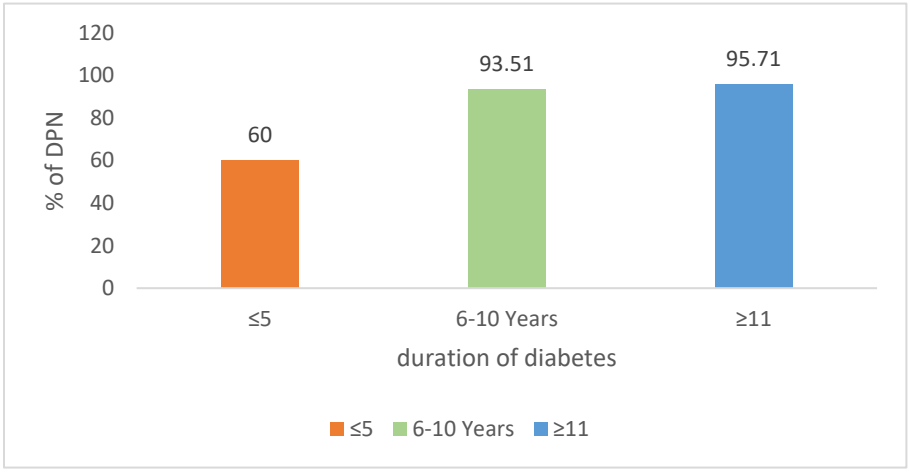

Table 6- Association between age, gender, smoking, alcohol consumption,family history of diabetes and prevalence of DPN- DNS method (n=385)

Potential risk factors	Sub - Category	Total number	Diabetic peripheral neuropathy (DPN) Abnormal
Age*	30-39	28((4.9)	3(10.71)
	40-49	123(30.4)	20(16.26)
	50-59	80(27)	63(78.75)
	≥60	155(37.8)	137(88.38)
χ^2 = 2.328, df =3, P < 0.001*			
Gender*	Male	162(35.4)	128(79.01)
	Female	223(64.6)	153(68.60)
χ^2 = 7.890, df = 1, P = 0.002*			
	No	212(55)	168(79.24)
Smoking	Yes	173(44.9)	147(84.97)
χ^2 = 0.305, df = 1, P = 0.501			
Alcohol	No	223(57.92)	125(56.05)
consumption*	Yes	173(42.07)	112(69.13)
χ^2 = 4.856, df = 1, P = 0.024*			
Family History of	No	95(34)	65(48.87)
DM			
	Yes	379(65.45)	159(63.09)
χ^2 = 1.405, df =1, P = 0.221			

Figure in parentheses indicate the percentage of respective frequency
χ^2 = Chi-square value and df = degree of freedom
**Potential risk factors significantly associated with prevalence of DPN,*

Table 7 :- Association between diet, BMI, central obesity, truncal obesity, duration of diabetes and prevalence of DPN – DNS method (n=385)

Potential Risk factors	Sub-Category	Total Number	Diabetic peripheral neuropathy (DPN) Abnormal
Diet	Veg Mixed	80(20.77) 305(79.22)	45(56.25) 178(58)
χ^2= 1.325, df = 1, P < 0.201			
BMI	≤18.9	6(1.5)	2(33.33)
	19-24.9	80(20.77)	43(53.75)
	25-29.9	145(37.66)	102(70.34)
	≥30	154(40)	98(63.63)
χ^2 = 3.787, df = 3, P < 0.265			
Central obesity	No Yes	198(51.42) 187(48.57)	128(64.64) 125(66.84)
χ^2 = 0.015, df = 1, P = 0.894			
Truncal obesity	No Yes	178(46.23) 207(53.70)	120(67.41) 138(66.66)
χ2 = 1.012, df = 1, P = 0.263			
Duration of	≤5Years	35(9)	21(60)
DM*	6-10	140(36.36)	131(93.51)
	≥11	210(54.54)	201(95.71)
χ^2 = 3.780, df = 3, P < 0.001*			

Figures in the parentheses indicate the percentage of respective frequency, χ^2 = Chi-square value and df = degree of freedom
**potential risk factors significantly associated with prevalence of DPN,*

Table 8: Risk factors of Diabetic Peripheral Neuropathy

Risk factors	Sub-Category	Multivariate analysis		
		DNS scoring method		
		OR	95% CI	P value
	30-39	1	-	-
Age* (Years)	40-49	1.132	0.038-30.59	0.800
	50-59	6.122	0.211-163.99	0.270
	≥60	11.503	0.546-212.49	0.130
χ^2= 2.424, df = 3, P < 0.001*				
	≤ 5	1	-	-
Duration of DM* (Years)	6-10	480.878	105.17- 1950	< 0.001*
	≥11	825.120	156.28- 4251	< 0.001*
χ^2= 3.799, df = 5, P <0.001*				
	Male	1	-	-
Gender	Female	0.488	0.150-1.118	0.431
χ^2= 7.994, df = 1, P = 0.003*				

DISCUSSION

Diabetic peripheral neuropathy is one of the most common complications of diabetes mellitus and it may be the first presenting symptom among T2DM. The prevalence of DPN varies from 5-100%. Results of the present study showed that 48.57% ofthe participants among T2DM had clinical evidence of diabetic peripheral neuropathy while other studies reported 27.8% a study conducted by Franklin et al. Ashok S and his colleagues observed a prevalence of neuropathy was 5.4% in patients with T2DM at the time of diagnosis. This difference in the prevalence of peripheral diabetic neuropathy in various studies is probably due to differences in modalities used for assessing the prevalence of diabetic peripheral neuropathy. Present study used clinical examination which includes Diabetic neuropathy symptom score (DNS). [43-45]

Results of present study showed that the prevalence of DPN increases with advancement in age and with duration of diabetes which suggest that the age and duration of diabetes are risk factors for the prevalence of DPN. In addition, present study further

showed that participants with age ≥60-year, duration of diabetes ≥ 11 years had a highrisk of developing DPN. This observation was comparable to study conducted by Fargol Booya et al on 110 patients in Iran which reported that age and duration of diabetes arethe contributing factor for developing DPN. Results of another study conducted by R Predeepa and Rema M in urban south Indian population are also comparable with our observations. Further, present study also showed that gender was significantly associated with prevalence of DPN whereas diet, BMI, truncal and central obesity,smoking, alcohol consumption and family history of diabetes did not show any significant association. These findings are comparable to study reported by MJ Young et al on prevalence and associated risk factors of diabetic peripheral neuropathy in the United Kingdom (Multicentric study). In summary, we found a higher prevalence DPN in the study area. Age, occupation, smoking, alcohol consumption, family history of diabetes, diet, BMI and truncal obesity are relative risk factors for DPN. Further, advanced age and duration of diabetes appear to be significant risk factors for developing DPN.[46,47]

CONCLUSION:

A relatively high, higher than hypothesized, prevalence of DPN were noted in the population of Indore, Madya Pradesh. The observations from the present study may be useful in local adaptations in planning, implementation and evaluation of the national health programs such as the National Programs for control of Diabetes, Cardiovascular diseases and Stroke (NPDCS). High prevalence of DPN even in urban and rural community of Indore, suggests the impact of socioeconomic transition on the occurrence of DPN**.**

The parameters chosen in the present study for assessing and DPN (DNS scoring methods) are in accordance with the recommendation of Task force of the European society of cardiology and ADA& AAN. The present study showed reduction in values of DNS clinical assessment methods, which seem not only to carry negative prognostic value but also to precede the clinical expression of diabetic peripheral neuropathy.

Advancing age and increasing duration of diabetes appear to be risk factors for development of DPN. DNS scoring methods can be used as screening tools for assessment of DPN in community settings. There is need to institute screening and awareness programs for early detection of diabetic complications to prevent long term complications. The findings of this study suggest the need for the promotion of preventive measures to prevent or delay the development of chronic complications of diabetes through good glycemic control, regular monitoring, lifestyle modification, practice of exercise and yoga to maintain the normal balance of sympathetic and parasympathetic tone.

RECOMMENDATIONS

Given the high prevalence of Diabetic Peripheral Neuropathy (DPN) observed in individuals with Type 2 Diabetes in this study, it is recommended to implement routine screening for DPN in clinical practice. Early diagnosis of DPN is crucial to prevent complications such as foot ulcers, infections, and amputations. Hospitals and healthcare providers should utilize simple, cost-effective screening tools like the 10g monofilament test, vibration perception test, and detailed foot examinations during routine check-ups for diabetic patients. These screening measures can aid in the timely identification of neuropathy, allowing for early interventions to mitigate its progression.

Present study highlights poor glycaemic control as a significant risk factor for the development and progression of DPN. Therefore, it is strongly recommended that healthcare professionals focus on maintaining optimal blood glucose control in

individuals with Type 2 Diabetes. This can be achieved through patient education on the importance of regular blood glucose monitoring and adherence to prescribed medications. Additionally, healthcare providers should aim for target HbA1c levels of less than 7%, as this has been shown to reduce the risk of developing diabetic complications, including DPN. Lifestyle modifications such as a healthy diet, regular physical activity, and weight management should also be encouraged as part of a comprehensive diabetes care plan.

LIMITATIONS OF THE STUDY

Measurement of HbA1c would have provided a better assessment of the glycemic status of the individuals. The dose response relationship of smoking andalcohol consumption would have been useful for exploring the association with development of diabetic neuropathy in a more comprehensive manner. Use of vibration perception for the assessment of diabetic peripheral neuropathy may be considered foruse as a simple screening tool in a community setting.

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