

Assessment of Prevalence and the Risk Factors of Diabetic Peripheral Neuropathy at Primary Health Care Level at Nawab Shah

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ABSTRACT

Background: Diabetic Peripheral Neuropathy (DPN) is a common and difficult complication of diabetes and poses significant burden to many diabetics and the public health-care system. Diabetic patients in rural areas have higher risk of developing diabetes related complications and have inadequate access to proper treatment especially low-income countries.

Objectives: To determine prevalence of diabetic peripheral neuropathy in patients with Type II diabetes in rural areas of Nawab Shah and to determine various risk factors the development of diabetic peripheral neuropathy in Type II diabetic patients.

Study Design: Cross-sectional study

Place and Duration of Study: Study was done in rural areas of Nawab Shah District (SBA), 06 months from September 2020 to February 2021

Methodology: One thousand and fifty-seven diabetic patient's demographic parameters and diagnostic criteria depend on primary care setup first three were enrolled.

Results: The overall prevalence rate in rural areas the Nawab Shah was almost 57.42%.

Conclusion: The prevalence of diabetic peripheral neuropathy increased with increasing age and it is observed to be associated with duration of diabetes, physical activity, smoking habit and systemic hypertension.

Keywords: Diabetes mellitus, Peripheral neuropathy, Risk factors, Rural population, Prevalence

INTRODUCTION

Diabetes mellitus (DM) is multifaceted endocrine disease which is characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both.^{1,2} Diabetes is getting more and more recognition as an epidemic properties worldwide.^{3,4} In past diabetes considered as a disease of high socioeconomic populations.^{5,6} But the trend is changed and now this non-communicable endocrine disorder is effecting in every population of the world specially underdeveloped countries.⁷

Diabetes is a one of the fastest growing world-wide health problems of 21st century.³ Epidemiologist and researchers estimates that number of diabetic patents in 2019 was 463 million and will increase to 578 million by year 2030, and will reach to 700 million by year of 2045.^{5,8}

International Diabetes Federation IDF data states that Pakistan ranks 4th in the world and the prevalence of diabetes are 19.4 millions. Also 3 in 4 (79%) of total population of the world is living in the low socioeconomic countries.^{1,3,9} Among all forms of diabetes the Type II diabetes is the commonest form contributes 90%.^{3,8}

Long standing hyperglycemia may developed different type of micro- and macro-vascular complications in diabetic subjects and neuropathy is the most prevalent micro-vascular complication found in all types of diabetes.^{10,11}

It can affect the central, auto and peripheral neural system in human body and know as Diabetic Peripheral Neuropathy (DPN). The most common type of neuropathy found in diabetes is peripheral neuropathy.^{12,13} DPN defined by Toronto Consensus Panel as the length-dependent sensorimotor polyneuropathy, symmetrical dependent to the changes made by the long standing hyperglycaemia.^{14,15} Diabetic peripheral neuropathy (DPN) occurs in around 347 million 60-70% of diabetics globally.¹⁶⁻¹⁸

Most common complication of the diabetes is diabetic peripheral neuropathy found in diabetics.

It can affect almost half of the diabetics and also the important risk factor for the development of ulceration of the foot in uncontrol diabetes.^{11,19} Which may further complicate and results in amputation of foot. Non-traumatic lower limb amputations mainly result from diabetic foot in developed countries. These days the

assessment of the peripheral neuropathy is the part of regular physical exam of diabetic patients.²⁰

Diabetic peripheral neuropathy is notably one of the commonest complications of diabetes mellitus with devastating clinical, economic and psychological concerns.^{16,17} The management and preventive approaches for this microvascular disorder require a considerate on its burden and determinants in specific population.^{21,22} Its quite difficult to manage once symptoms appears.²³⁻²⁵

Its needed to treat and diagnose early stages of the diabetic peripheral neuropathy to avoid serious DPN related outcomes like gangrene, ulcers and the sinister lower limb amputations and the socioeconomic factors of the disease.^{14,26-30}

METHODS AND MATERIALS

A Cross-sectional, multi-centric study performed in rural areas of Nawabshah district in Sindh Province Pakistan. Nawab Shah (SBA) district congested populated area having almost 147 health facilities.⁹ We arranged four Rural Health Centres (RHC) and many BHU (basic health units) was randomly.^{31,32} The diabetic individuals were approached on the day of the diabetic clinic on that particular RHC/BHU. The registered participants were twice examined. In 1st instant individual registered and assessed properly and on 2nd instant, collecting all biochemical examination. In this way all participants were examined for the study. Patients (both genders) those who were aged more than 30 years and diagnosed positive for Type II Diabetes and willing to participate were included. Type I diabetes and MODY, gestational diabetes, patients with non-diabetic neuropathies and non-willing were excluded.

Data was collected using an identical questionnaire which was followed by general inspection and physical examination of the feet/extremities. Blood samples were taken to estimate HbA1c, dyslipidaemia and urine sample was also collected to detect the presence of albumin/nephropathy. Diagnostic criteria depend on following point, but in our primary care setup first three are applicable. Diabetic Neuropathy Symptom Score (DNS), Diabetic Neuropathy Examination Score (DNE) and Semmes-Weinstein monofilament examination (SWME) were used. Detailed history relevant to demographic details, lifestyle patterns, neurological

symptoms, co-morbid illnesses and various risk factors was obtained using questionnaire comprising of demographic and biochemical parameters.

The data was entered and analysed through SPSS-25. Different variable means was tested by using t-test and ANOVA tests. P-value <0.05 was considered statistically significant once analysed different results of this study.

RESULTS

There were 643 (60.8%) males and 414 (39.4%) females. Six hundred and seven (57.42%) patients have DPN (males 377 & females 230) and 450 (42.48%) patients do not have DPN (males 306 & females 184). Of 607 patients are reported with DPN where 38 (6.3%) patients were between 30-40 years, 162 (26.7%) patients were between 41-50 years, 182 (29.9%) patients were between 51-60 years, 133 (21.9%) patients were between 61-70 years and 92 (15.2%) patients >70 years respectively (Table 1). All detailed information regarding the association of risk factors and prevalence of DPN. The overall prevalence rate in rural areas the Nawab Shah is almost 57.42% (Tables 2-4).

Table 1: Distribution/ assessment of study participants based on socio-demographic characteristics (n=1057)

Characteristics	No.	%
Age (years)		
30-40	119	11.25
41-50	316	29.93
51-60	324	30.64
61-70	165	15.65
>70	133	12.53
Gender		
Male	643	60.9
Female	414	39.1
Family history of diabetes HbA1C (%)		
Controlled < 7%	307	29.00
Uncontrolled ≥ 7%	750	71.00
Nephropathy	133	12.58
Dyslipidemia	867	82.02
Other co-morbid (CVS diseases)	387	36.61
BMI (kg/m ²)		
Normal	199	18.82
overweight	543	51.37
obese	415	39.26
Duration of diabetes (years)		
<5	229	21.7
5-10	571	54.0
>10	257	24.3
History of smoking		
Present	321	30.36
Absent	736	69.64
History of alcohol intake		
Present	35	3.2
Absent	1022	96.8
Known case of hypertension		
Present	625	59.2
Absent	432	40.8

Table 2: Assessment of diabetic peripheral neuropathy and various risk factors of the study participants (n=1057)

Variable	Peripheral Neuropathy	
	Present (n=607)	Absent (n=450)
Age (years)		
30-40	38 (6.3%)	81 (18%)
41-50	162 (26.7%)	154 (34.3%)
51-60	182 (29.9%)	142 (31.7%)
61-70	133 (21.9%)	32 (7.3%)
>70	92 (15.2%)	39 (8.7%)
Gender		
Male	377 (62.2%)	306 (68%)
Female	230 (37.8%)	184 (32%)
HbA1C (%)		
Controlled < 7%	155 (25.3%)	152 (33.7%)
Un-controlled	422 (74.7%)	328 (66.3%)

Family history		
Present	413 (68%)	296 (65.7%)
Absent	194 (32%)	154 (34.3%)
Nephropathy		
Present	99 (16.3%)	34 (7.5%)
Absent	508 (83.7%)	416 (92.5%)
Dyslipidemia		
Present	505 (83.2%)	381 (84.7%)
Absent	102 (16.8%)	69 (15.3%)
Body mass index (kg/m ²)		
Normal	53 (8.7%)	46 (10.2%)
Overweight	199 (32.7%)	244 (54.3%)
Obese	355 (58.6%)	160 (35.5%)
Duration of diabetes (years)		
<5	91 (14.9%)	138 (30.7)
5-10	356 (58.6%)	215 (47.7)
>10	160 (27.5%)	97 (21.6)
History of smoking tobacco		
Yes	254 (41.8%)	167 (37.2%)
No	531 (58.2%)	205 (62.8%)
History of alcohol intake		
Yes	29 (4.7%)	6 (1.4%)
No	578 (95.3%)	444 (98.6%)
Known case of systemic hypertension		
Yes	365 (60.2%)	260 (57.8%)
No	242 (39.8%)	190 (42.2%)

Table 3: Assessment of DNP on composite questionnaire

Questioner	Result
Symptoms of unsteadiness in walking?	294
Do you have a burning, aching pain or tenderness of your legs or feet?	313
Do you have pricking sensations our legs and feet?	156
Do you have places of numbness on your legs or feet?	157

Table 4: Specific examination for DPN

Physical examination	Right foot	Left foot
Abnormal appearance of feet	296	298
Ulceration	35	31
Ankle reflexes abnormality	176	183
Vibration perception abnormality (128-Hz tuning fork)	246	249
Monofilament test abnormality (10g)	304	314

DISCUSSION

This study showed that the prevalence of the DPN among diabetic population at Primary Health care settings in Nawabshah is 57.42%. we observe that Diabetic Peripheral Neuropathy is a slow growing and not apparent process which is effecting the patient silently and the pathophysiological changes are non-consistent with the time frame of appearance of the clinical symptoms and the level of severity of the symptoms.³³ The clinical sign and symptoms includes neuropathic pain (burning sensation, tingling electric, sharp, and shooting pain). Further may results in the ulceration of the foot and foot amputation.³⁴ DPN can disturbed the daily routine activities like sleep, leisure activities, mobility and outdoor social activity of most diabetic patients as it elicited with burning and pain in lower limbs.³⁵

Increase in the duration of diabetes the prevalence of the DPN is also increase. Also seen in some study results that DPN prevalence is high in diabetic subject who are diagnosed more than 10 years ago.³⁶

Uncontrolled hyperglycaemia also causes nerve damage which leads to neuropathy, but blood sugar levels can be controlled using hypoglycaemic agents on time and maintaining healthy food habits and exercising regularly.³⁷ Although the patients with low economic status should be provided with free treatment and vitaminsupplements, because, due to lack of knowledge regarding the usage of drugs, and inadequate patient education, many patients with T2DM fail to take nutritious food and vitamin supplementations. The mean age for the presence of DPN in Typell diabetic patients is 54.5 years. Most of the patients with DPN are in age group of 41-60 years. DPN's prevalence increases

with the extent of the diabetes.³⁸ Patients who are having diabetes for more than 10 years are presented with more symptoms of DPN, as for as HbA1c value concerned, different type of glycerated hemoglobin are found in RBCs, which are HbA1a, HbA1b, and HbA1c. Most common among them is HbA1c almost 70% and found with very stable structure that's why used worldwide for the monitoring of diabetes control. HbA1c can indicate the risk of developing of DPN. Good control of diabetes can reduce the risk of DPN.³⁹

Different types of screening test used to detect DPN and analyse the results to facilitate the primary health care physician and nurses to detect the DPN by simple and reliable screening test which can be performed at primary care level easily. Also analyse any presence of significant correlations between them. As 128-Hz tuning fork test and 10-g monofilament were the accurate and most sensitive of all the diagnostic tests which is almost easily available in our Primary Health care setup. The most precise screening test is ankle reflex, but it has low sensitivity and accuracy. The results of combined tests (tuning fork and monofilament) are more accurate and has high sensitivity as compared to the results of each alone. The examiner also plays a vital role in the scoring system of the sign and symptoms of DPN, each screening tests has different way to detect neuropathy.

There is no specific treatment is available present so we need to educate diabetics to prevents this complication by good control of blood sugar from the first day of there diabetic life. Its also suggested that early detection of the DPN sign and symptoms is key to prevent further threatening outcomes of this disease, which can increase the mortality and also increase the overall medical expenses. Growing age of diabetes and the occurrence of this disorder in later half the life can be an important factor for DPN. Many risk factors are associated with DPN can be smoking, high level of cholesterol, fatty acids, phospholipids and some other inflammatory markers. Many studies results stats that dyslipidaemia is a risk factor in development of DPN. In addition to risk factors are age of diabetes, control of diabetes (level of HbA1c) increasing age, and obesity (BMI). Presence of above risk factors can increase the incidence of DPN in diabetics. Prevalence of DPN is directly related to the control of diabetes so we need to educate the diabetics and to strengthen our primary level of health care to facilitate and to provide better health care to the diabetic patients.

CONCLUSION

The duration of diabetes, raised HbA1c level, hyperglycaemia and age are associated with significantly increased risks of Diabetic Peripheral Neuropathy among diabetic patients. These findings provide a scientific basis for a further understanding of the causes of Type II diabetes complicated with peripheral neuropathy and the results of preventive strategies. Finally, it is cleared to us during studies at different health facilities of Nawab Shah that diabetic education has vital role to prevent the hazardous increase in incidence in DPN as well as diabetes.

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