

# Prevalence of Peripheral diabetic Neuropathy and its Association with patients related factors

ARIFA SHAMIM<sup>1</sup>, AROOJ HAQ<sup>2</sup>, MARYAM ALI<sup>3</sup>

## ABSTRACT

**Aim:** To determine the prevalence of peripheral diabetic neuropathy (PDN) in patients of type-2 diabetes and association of patient related variables with PDN.

**Methods:** This case control study was conducted in Bakhtawar Amin hospital Multan. We included 110 patients of type-2 diabetes within duration of 7 months (From Nov-2016 to May-2017) in this study. Diagnosis of PDN was made using previous history, physical examination and vibration perception test of the patients. We noted age, gender, BMI, HbA1c levels, smoking history, diabetes duration and duration of diabetes in all patients.

The data was analysed by using SPSS v23. Association of age, duration of diabetes and BMI with PDN was compared Student's t-test. Moreover, association of gender and smoking history with PDN was compared using Chi-square t-test.

**Results:** In our study, the prevalence of PDN was 51.8%. The mean age was higher in patients having PDN,  $56.43 \pm 6.96$  years versus  $48.42 \pm 6.18$  years in patients without PDN ( $p$ -value  $< 0.001$ ). Duration of diabetes mellitus was also prolonged in PDN patients  $10.7 \pm 6.3$  years versus  $8.9 \pm 4.8$  years in patients without PDN with  $p$ -value of  $< 0.001$ . There were 43.90% patients belonging to lower class in PDN patients and only 15.10% patients were of lower class that did not have PDN. There were 45.30% patients belonging to upper class in non-PDN group and only 10.50% in PDN group ( $p$ -value  $< 0.001$ ).

**Conclusion:** Patients age, duration of diabetes mellitus and socioeconomic status are independent predictors of the development of peripheral diabetic neuropathy in diabetic patients.

**Keywords:** Type 2-diabetes mellitus, peripheral diabetic neuropathy

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## INTRODUCTION

Diabetes mellitus has become very common. About 371 million people are diagnosed each year with a prevalence rate of about 8.3%. Type-2 diabetes mellitus is the most common form<sup>1</sup>. Most of the patients remains asymptomatic for a longer duration of time until the symptoms of complications of diabetes mellitus begins to appear. Among the various complications of type-2 diabetes, peripheral diabetic neuropathy (PDN) "that effects microcirculation" is one of them<sup>2,3,4</sup>. PDN is defined as the diabetic patients having dysfunction of peripheral nerves in the absence of other causes of dysfunction.<sup>4</sup> PDN significantly increases the risk of infections especially foot ulcers and ultimately limb amputations. The initial symptom of PDN is loss of sensation in toe, then whole foot and the leg after that<sup>5,6</sup>.

Many patients ( $\approx 40$ -50%) of PDN develop pain along neuropathy known as painful PDN<sup>7</sup>. PDN and painful PDN has significant effects on health care cost and increase the cost of management of

diabetes in effected patients. These are also a major cause of absence from duties, disturbed working hours and disability in these patients<sup>8</sup>.

The estimated prevalence of diabetes in Pakistan is 6.8% and there are more than 87 thousands death every year in Pakistan due to diabetes.<sup>9</sup> There is little data published from Pakistan about the prevalence and risk factors of PDN. In present study, we evaluated the prevalence of PDN and association of patient related variables with PDN.

## METHODS

This case control study was conducted in Bakhtawar Amin hospital Multan. We included 110 patients of type-2 diabetes within duration of 7 months (From Nov-2016 to May-2017) in this study. Patients having fasting blood sugar levels  $> 7$  mmol/L or random blood sugar levels  $> 11.1$  mmol/L, along with other clinical symptoms such as weight loss, polydipsia and polyuria, were diagnosed as diabetics. Diagnosis of PDN was made using previous history, physical examination and vibration perception test of the patients. Patients having neuropathy due to other causes and having chronic kidney failure were excluded.

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<sup>1</sup>Demonstrator Biochemistry, <sup>2</sup>Demonstrator Biochemistry,

<sup>3</sup>Women Medical Officer,

Bakhtawar Amin Medical and Dental College Multan

Correspondence to Dr. Arifa Shamim Email Id:

doctors.pak01@gmail.com Cell: 0334-6032445,

Patients were divided into case and control group on the basis of diagnosis of PDN. We noted age, gender, BMI, HbA1c levels, smoking history and duration of diabetes in all patients.

The data was analysed using SPSS v23. Association of age, duration of diabetes, height and BMI with PDN was compared Student's t-test. Moreover, association of gender and smoking history with PDN was compared using Chi-square t-test.

**RESULTS**

In our study, the prevalence of PDN was 51.8%. The mean age of patients in this study was 56.24±8.24 years. The mean age was higher in patients having PDN 56.43±6.96 years versus 48.42±6.18 years in patients without PDN (p-value <0.001). There were 52.6% females in PDN group and 52.8% in non-PDN

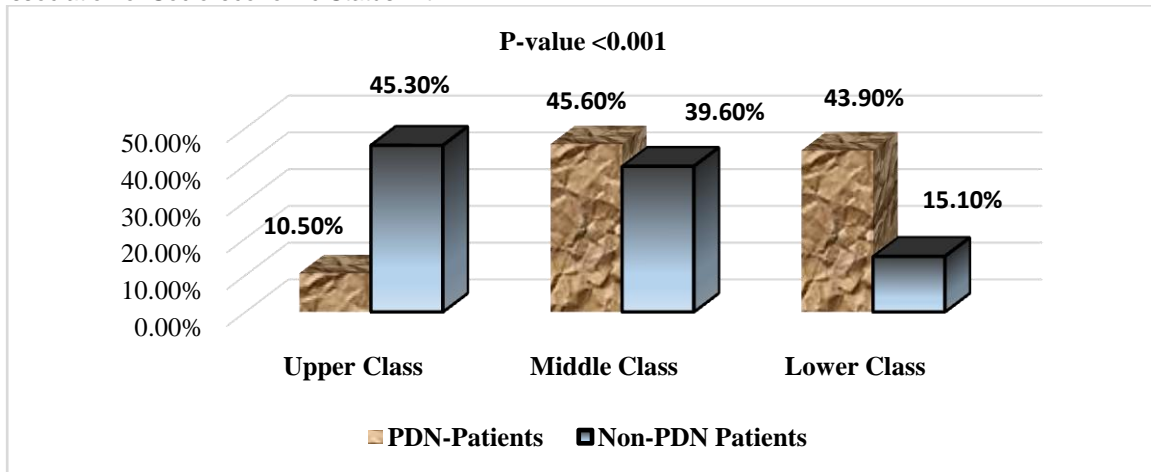
patients. Duration of diabetes mellitus was also prolonged in PDN patients 10.7±6.3 years versus 8.9±4.8 years in patients without PDN with p-value of <0.001. Mean HbA1c levels and BMI of patients were similar in patients with PDN and without PDN. There were 15.8% smokers in PDN group and 13.2% smokers in non-PDN group of patients (Table 1).

Most of the patients who presented with PDN were belonging to poor socio-economic status. Most of the patients who presented with PDN were belonging to lower socioeconomic status. There were 43.90% patients belonging to lower class in PDN patients and only 15.10% patients were of lower class that did not have PDN. There were 45.30% patients belonging to upper class in non-PDN group and only 10.50% in PDN group (p-value <0.001).

Table 1. Comparison of study variables.

	PDN patients (n=57)	Non-PDN patients (n=53)	P-value
Age (Years)	56.43±6.96	48.42±6.18	<0.001
HbA1c	8.5±2.3	8.7±2.2	0.3
Duration of diabetes (Yrs)	10.7±6.3	8.9±4.8	<0.001
Body Mass Index (Kg/m <sup>2</sup> )	27.10±4.43	26.04±4.22	0.2
Male Gender (%)	27 (47.4%)	25 (47.2%)	0.98
Female Gender (%)	30 (52.6%)	28 (52.8%)	
Smoking History (%)	9 (15.8%)	7 (13.2%)	0.70

Fig. 1: Association of Socio-economic Status with PDN



**DISCUSSION**

Peripheral diabetic neuropathy (PDN) is a devastating complication of diabetes mellitus. In this study, we evaluated the prevalence of PDN in diabetic patients. We also determined the association of various patient related variables with PDN. In our study, the prevalence of PDN was 51.8%. Other studies conducted in Pakistan have found 39.6% to 74.8% prevalence of PDN in diabetic patients<sup>10-</sup>

<sup>12</sup>. Studies conducted in other Asian countries have found 29.2% to 61% prevalence of PDN in these patients<sup>13,14</sup>. Soyupeket al. found neuropathy in his 80.4% diabetic patients<sup>15</sup>.

In our study, we found significant association of age with PDN, with a mean age of 56.43 years in PDN group and 48.42 years in Non-PDN patients. Mean age was more in PDN patients in the study by Bansal et al. with a mean age of 57.1 years in PDN patients and 52.5 years in patients without PDN(14).

Mean age of patients in study by Rai et al. was 62 years in PDN patients and 56 years in Non-PDN patients.<sup>13</sup> In our study, prevalence of PDN was more among females. Beghi et al., Barbosa et al. and Ashok et al. have also found female predominance in PDN patients<sup>16,17,18</sup>.

We found a significant effect of duration of diabetes on PDN. Mean duration of diabetes in PDN patients was 10.7±6.3 years versus 8.9±4.8 years in patients without PDN. Oguejiofor et al. concluded that prevalence of PDN is highest in patients with duration of diabetes >15 years and lowest in patients with diabetes duration <5 years.<sup>19</sup> Young et al. found 36.0% prevalence of PDN in patients with diabetes duration more than 10 years and only 20% in those having duration of diabetes < 5 years.<sup>20</sup> Diabetes duration also have significant effects on the rate of sensory neuropathy and skin denervation<sup>21,22</sup>.

In our study, we found significant association of socio-economic status with PDN. We found 43.90% patients belonging to lower class in PDN patients and only 15.10% patients of lower class in Non-PDN patients. Morkridet al<sup>23</sup> also found significant effect of socio-economic status on the prevalence of PDN like our study.

We did not find any association of BMI with PDN, BMI was almost same in both groups. Other studies have also found similar results<sup>13,24</sup>. We also did not find any association of smoking history with PDN.

## CONCLUSION

In conclusion, patients age, duration of diabetes mellitus and socioeconomic status are independent predictors of the development of peripheral diabetic neuropathy in diabetic patients.

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