



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 5.2  
IJAR 2019; SP7: 103-105

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(Special Issue-7)

**“International Conference on Science and Education:  
Problems, Solutions and Perspectives”**

(3<sup>rd</sup> June, 2019)

## **Diabetic peripheral neuropathy in type II diabetes mellitus patients**

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### **Abstract**

**Background:** Diabetes mellitus (DM) is a devastating metabolic disorder that places an economic burden for every country around the world with the global increasing trend. The present study was conducted to assess diabetic polyneuropathy in type II diabetic patients.

**Materials & Methods:** 240 type II diabetes patients of both genders were assessed for numbness, ulcerations loss of reflexes. Assessment of diabetic polyneuropathy was done.

**Results:** Out of 240 patients, males were 150 and females were 90. Out of 240 patients, 102 (42.5%) had PNP. In patients with PDN, 76 had ulcerations and 58 had numbness of limbs. There were 4 cases of DPN with 5 years, 30 cases with 5-10 years and 68 cases with >10 years of diabetes history. The difference was significant ( $P < 0.05$ ).

**Conclusion:** Authors found that high prevalence of diabetic peripheral neuropathy among type II diabetic patients.

**Keywords:** Diabetes, diabetic peripheral neuropathy, Lim

### **Introduction**

Diabetes mellitus (DM) is a devastating metabolic disorder that places an economic burden for every country around the world with the global increasing trend<sup>[1]</sup>. Type 2 DM is characterized by insulin resistance, with or without insulin deficiency that induces organ dysfunction. Persistent hyperglycemia in DM generates reactive oxygen species (ROS) and nitrosative species (RNS); both are considered an essential factor for DM macro- and microvessels complications<sup>[2]</sup>. Along with overproduction of ROS and RNS, a reduction of the activity of antioxidant enzymes is known to cause endothelial dysfunction, insulin resistance, and DM complications<sup>[3]</sup>. Furthermore, oxidative stress inhibits insulin secretion in pancreatic  $\beta$ -cells by activation of uncoupling protein 2 (UCP-2), which, in turn, reduces the adenosine triphosphate (ATP)/adenosine diphosphate (ADP) ratio, and thus reduces the insulinsecretory response. This approach explains the pancreatic dysfunction induced by glucose toxicity, as part of the pathophysiology of DM<sup>[4]</sup>.

The two main complications affecting limbs, mainly feet and legs, are diabetic polyneuropathy (DPN) which affects between 30 and 50% of diabetics and diabetic leg and foot ulcers. The lifetime incidence of foot ulcers occurring in DM patients is up to 25%. Diabetic neuropathy is the primary risk factor for the development of diabetic foot ulcers and is implicated in 50–75% of nontraumatic amputations<sup>[5]</sup>. Neuropathy is the most common microvascular complications among diabetics that can involve peripheral, central and/or autonomic nervous systems. It can also develop at earlier stages of dysglycemia as in the prediabetics phase<sup>[3]</sup>. Peripheral neuropathy (PN) is the predominant variety in patients with diabetes whether type 1 or type 2. It manifests as distal symmetrical polyneuropathy (DSPN), also known as diabetic peripheral neuropathy (DPN), causing nerve damage in the extremities particularly the feet<sup>[6]</sup>.

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The present study was conducted to assess diabetic polyneuropathy in type II diabetic patients.

**Materials & Methods**

The present study was conducted among 240 type II diabetes patients of both genders. All were informed regarding the study and written consent was obtained. Data such as name, age, gender etc. was recorded. Patients were subjected to fasting blood sugar, random blood sugar and glycosylated hemoglobin. A thorough clinical examination was done. Physical signs such as numbness, ulcerations loss of reflexes were recorded. Assessment of diabetic polyneuropathy was done. Results were tabulated

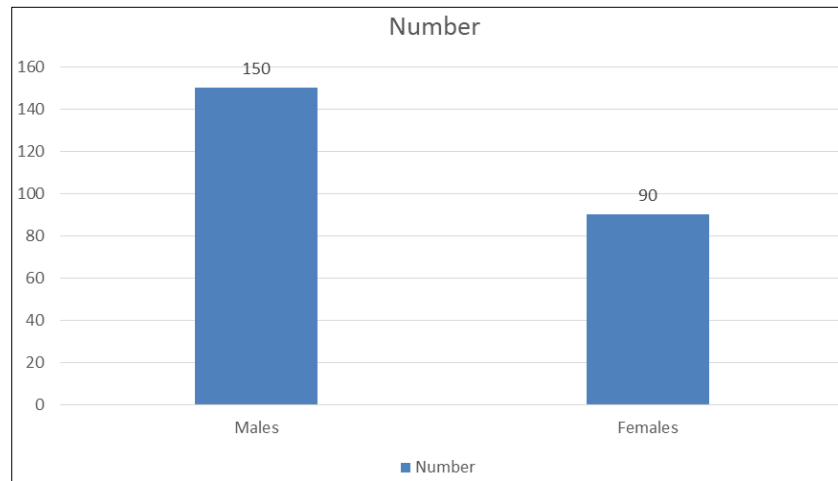
and subjected to statistical analysis using Mann Whitney U test. P value < 0.05 was considered significant.

**Results**

**Table 1:** Distribution of patients

Total - 240		
Gender	Male	Female
Number	150	90

Table I, graph I shows that out of 240 patients, males were 150 and females were 90.



**Graph 1:** Distribution of patients

**Table 2:** Prevalence of DPN in DM patients

Total	Number	Percentage
240	102	42.5%

Table II, shows that out of 240 patients, 102 (42.5%) had PNP.

**Table 3:** Assessment of parameters

Parameters	Variables	Number	P value
Clinical findings	Ulcerations	76	0.80
	Numbness	58	
Duration of Diabetes (Years)	5	4	0.02
	5-10	30	
	>10	68	

Table III shows that in patients with PDN, 76 had ulcerations and 58 had numbness of limbs. There were 4 cases of DPN with 5 years, 30 cases with 5-10 years and 68 cases with >10 years of diabetes history. The difference was significant (P<0.05).

**Discussion**

Diabetic neuropathy is characterised by a length related distal distribution of sensory and motor symptoms and signs [7]. As autonomic involvement occurs in many patients with diabetic symmetric distal polyneuropathy (DSDP), and forms an important part of the clinical complex, it is best that both are considered together [8]. It is highly likely that by the time DPN is diagnosed, the patient with either type 1 or type 2 diabetes will have had a prolonged period (sometimes over years) of abnormal glucose metabolism. This is particularly the case in those with type 2 DM who

tend to be “discovered” to be diabetic on presentation with symptoms and signs of a neuropathy [9]. DPN when present is mainly irreversible; hence screening and identifying associated potentially modifiable risk factors is very crucial especially for the low-income countries. The main risk factors that are known to be associated with DPN are increasing age, longer duration of diabetes since diagnosis, poor glycemic control, and increased body mass index [10]. The present study was conducted to assess diabetic polyneuropathy in type II diabetic patients.

In this study, out of 240 patients, males were 150 and females were 90. We found that out of 240 patients, 102 (42.5%) had PNP. Hicks *et al.* [11] found that the prevalence of peripheral neuropathy is estimated to be between 6% and 51% among adults with diabetes depending on age, duration of diabetes, glucose control, and type 1 versus type 2 diabetes. The clinical manifestations are variable, ranging from asymptomatic to painful neuropathic symptoms. Because of the risk of foot ulcer (25%) and amputation associated with diabetic peripheral neuropathy, aggressive screening and treatment in the form of glycemic control, regular foot exams, and pain management are important. There is an emerging focus on lifestyle interventions including weight loss and physical activity as well.

We found that in patients with PDN, 76 had ulcerations and 58 had numbness of limbs. There were 4 cases of DPN with 5 years, 30 cases with 5-10 years and 68 cases with >10 years of diabetes history. Callaghan *et al.* [12] conducted a study and found that the mean age was 57.2 yrs. A total of 238 (72%) had type 2 and 89 (27.2%) had type1 DM. The prevalence of peripheral neuropathy was 72.2% of whom 55% were severe, 19% were moderate, and 26% were mild.

The severity of neuropathy increased with the increase in age >40 years and increase in body mass index ( $p < 0.001$ ) and duration of diabetes; duration >7 years. The main associated factors were age >40 years, OR 2.8, >60 years, OR 6.4, obesity, OR 6.7, and hypertension.

Atypical forms of diabetic peripheral neuropathy include mononeuropathies (i.e. mononeuritis multiplex), (poly) radiculopathies, and treatment-induced neuropathies. Mononeuropathies are closely associated with diabetes, and tend to affect the median, ulnar, radial, or common peroneal nerves [13]. Cranial nerve involvement is extremely rare, and usually presents as an acute mononeuropathy affecting cranial nerves III, IV, VI, or VII. Diabetic radiculopathies typically involve the lumbosacral plexus, and present primarily as unilateral thigh pain and weight loss with subsequent motor weakness [14]. Treatment-induced neuropathy is a rare iatrogenic event that occurs in patients following periods of extreme metabolic dysregulation (i.e. ketoacidosis), or following a sudden and substation change in glycemic control (i.e. insulin neuritis). Each of the atypical diabetic peripheral neuropathies are largely self-limited, and will resolve over several months with supportive care, medical management, and physical therapy [15].

### Conclusion

Authors found that high prevalence of diabetic peripheral neuropathy among type II diabetic patients.

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