Original Article

Frequency of Peripheral Neuropathy among Patients of Type 2 Diabetes Mellitus by Using the Michigan Neuropathy Screening Instrument

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ABSTRACT

Background: Diabetic peripheral neuropathy is a common complication of type II diabetes mellitus. Chronic pain is the most common characteristics of neuropathy. It has a major impact on the quality of life of a person and usually it is not managed satisfactorily. Moreover, there is no local study found in literature which could help us in determining the extent of problem in local population. So, we conducted this study to get local evidence. To assess the frequency of peripheral neuropathy in patients with type II diabetes mellitus by using Michigan clinical diabetic neuropathic scoring. **Methodology** It is a cross sectional study conducted in medical department of Services Hospital, Lahore for 6 months duration. A total of 207 cases fulfilling selection criteria were enrolled in study. Patients were assessed for peripheral neuropathy by using score MNSI. Questions regarding neuropathy were asked and recorded. Peripheral neuropathy was labeled if MNSI score ≥ 7. All the information was collected on proforma. Data was entered & analyzed into SPSS version-21. **Results:** The average age of the patient was 60.03±8.86years. There were 113 (54.59%) males and 94 (45.41%) female subjects. The mean HbA1c of patients was 12.17±3.72%. The mean MNSI score of patients was 754±4.28. In this study sample, there were 108 (52.17%) patients of peripheral neuropathy while 99 (47.83%) did not have peripheral neuropathy. **Conclusion:** There is high incidence of peripheral neuropathy in diabetic patients in our local community.

Key words: peripheral neuropathy, type II diabetes mellitus, neuropathic scoring, HbA1c

Introduction

The "Diabetic peripheral neuropathy" is the common complication of diabetes mellitus. It has been assumed that it can be estimated in about 30% to 50% of patient with type II diabetes mellitus.[1]

Diabetic peripheral neuropathy (DPN), is a common in patients with type 2 diabetes mellitus, (DM) and it contributes to a greater risk of diabetic foot ulcer & lower limb amputation.[2] These situations can have a negative impact on the quality of life of those who are affected.[3,4]

Globally, as of 2015, it was estimated that 392.0 million patients of type II diabetes mellitus making up about 90% cases of type II diabetes mellitus.[5] This value is equivalent to the 6% of the whole population around the world.[6] It is common in both; among developed and developing countries. But, in the developing countries, still incidence is less frequent than developed countries.[7]

Approximately 25% of individuals with type II diabetes suffer diabetic complications when they are first diagnosed.[8] According to various studies, advanced age, long-term diabetes, cigarette smoking & poor glycemic control are the most prevalent risk factors for DPN.[9,10]

Obesity is seen in approximately 90% of people with type II diabetes mellitus. However, a population based on large number, a study has revealed that an energy dense diet can be a risk factor for the development1of1diabetes which is independent of baseline obesity.[11]

Screening DM individuals for DPN at initial possible stage in order to reduce the severity of these complications. This type of DPN tests for our area & outdoor settings positively predicts those people at risk of diabetic foot ulcer. Furthermore, in underdeveloped countries, current equipment is much less likely to be available to treat DPN patients.[12] As a result, early detection of DPN or its causes is important, specifically in developing countries with limited resources & poor level of education.

In previous studies, the patient of type 2 diabetes mellitus gave the history of symptoms of DM from about four to seven years ago, at the time of the diagnosis. Among the patients of type II diabetes mellitus, who were included in the "United Kingdom Prospective Diabetes Study," it was observed that retinopathy was noted in 25% patients, while neuropathy was present in 9% cases while nephropathy was detected in 8% patients at the time of diagnosis of type II diabetes mellitus. [13]

The rationale of this study is to assess the frequency of peripheral neuropathy in patients with type II diabetes mellitus by using MNSI scoring. Literature showed that the frequency of peripheral neuropathy is low among diabetics. But controversial data has been saved from the literature.

Methodology

The descriptive cross-sectional study was conducted from July 2018 to Jan 2019 in the Department Medicine, Services Hospital Lahore. After approval permission from the Institutional Board of the hospital. Written informed consent was obtained from the patients. Calculated sample size was 207 with 3.5% margin of error, 5% level of significance by taking expected percentage of peripheral neuropathy i.e., 7.10% in type II diabetes mellitus patients.

Patients with age 45 - 75 years of either gender presenting with type II diabetes mellitus; those diagnosed with diabetes mellitus for >1 year, had peripheral neuropathy and were taking corticosteroids (as per medical record). Patients with history of neurological disease like stroke, loss of dorsalis pedis pulses were excluded.

Demographic information (including name, age, gender, BMI, duration of type 2 diabetes mellitus) was also recorded. Then patients were assessed for peripheral neuropathy by using MNSI by a senior consultant having at least 4 years residency experience with assistance of researcher. All 53 questions regarding symptoms of neuropathy were asked one by one and output of patient was recorded. Peripheral neuropathy was labeled if MNSI score ≥7 was noted.

Data was entered & analyzed into SPSS version-21. Quantitative variables like age, MNSI score, BMI, HbA1c & duration of type 2 diabetes mellitus were presented as mean and SD. Qualitative variables like gender & peripheral neuropathy were presented as frequency or percentage. Data was stratified for age, gender, HbA1c, BMI duration of type 2

diabetes mellitus to control effect modifiers. The chi-square test was used to compare the frequency of peripheral neuropathy in stratified groups after stratification. P-value less than <0.05 were taken as significant.

Results

In this study, total 207 patients including 113 (54.59%) males and 94 (45.41%) females. The mean age was 60.03 ± 8.86 years. The average BMI of patients, diabetes duration, HbA1c, MNSI score was 29.77 ± 5.53 kg/m2, 11.17 ± 4.90 years, 12.17 ± 3.72 % and 754 ± 4.28 respectively (Table-1).

Table 1: Baseline characteristics of patients.

		Mean ± SD
Age (years)		60.03 ± 8.86
BMI (kg/m2)		29.77 ± 5.53
Duration of Diabetes(years)		11.17 ± 4.90
HbA1c (%)		12.17 ± 3.72
MNSI Score		7.54 ± 4.28
Gender	**Male**	113 (54.59%)
	Female	94 (45.41%

In this study sample, there were 108 (52.17%) patients of peripheral neuropathy while 99 (47.83%) did not have peripheral neuropathy. Data was stratified for age of patients. In patients aged 45-60 years, there were 53 (52.0%) patients of peripheral neuropathy while 49 (48.0%) did not have peripheral neuropathy. In patients aged 61-75years, there were 55 (52.4%) patients of peripheral neuropathy while 50 (47.6%) did not have peripheral neuropathy. The difference was statistically insignificant (p<0.05). Data was stratified for gender of patients. There were 62 (54.9%) patients in males and 46 (48.9%) patients in females of peripheral neuropathy while 51 (45.1%) patients in males and 48 (51.1%) patients in females did not have peripheral neuropathy. There was insignificant difference was (p<0.05). In patients with normal BMI, 24 (47.1%) patients had peripheral neuropathy while 27 (52.9%) did not have peripheral neuropathy. In overweight patients, 30 (54.5%) patients had peripheral neuropathy

while 25 (45.5%) did not have peripheral neuropathy. In obese patients, 54 (53.5%) patients had peripheral neuropathy while 47 (46.5%) did not have peripheral neuropathy. The difference was insignificant (p<0.05). In patients having diabetes from 1- 10years, there were 47 (52.8%) patients of peripheral neuropathy while 42 (47.2%) did not have peripheral neuropathy. In patients having diabetes from 11-20 years, there were 61 (51.7%) patients of peripheral neuropathy while 57 (48.3%) did not have peripheral neuropathy. P<0.05 were shown as insignificant difference between neuropathy and age group. In patients with HbA1c 6.5-10.0%, there were 38 (53.5%) patients of peripheral neuropathy while 33 (46.5%) did not have peripheral neuropathy. In patients with HbA1c 10.1-20.0%, there were 70 (51.5%) patients of peripheral neuropathy while 66 (48.5%) did not have peripheral neuropathy. There was insignificant difference (p<0.05) as shown in (Table 2)

Table-2: Comparison of peripheral neuropathy in different stratified groups.

	Peripheral Neuropathy	P value

		Yes	**No**	
Gender	**Male**	62 (54.9%)	51 (45.1%)	0.395
	Female	46 (48.9%)	48 (51.1%)	
Age (years)	**45-60**	53 (52%)	49 (48%)	0.952
	61-75	55 (52.4%)	50 (47.6%)	
BMI (Years)	**Normal**	24 (47.1%)	27 (52.9%)	0.696
	Overweight	30 (54.5%)	25 (45.5%)	
	Obese	54 (53.5%)	47 (46.5%)	
Duration of Diabetes	**1-10 days**	47 (52.8%)	42 (47.2%)	0.874
	11-20 days	61 (51.7%)	57 (48.3%)	
HbA1c (%)	**6.5 - 10**	38 (53.5%)	33 (46.5%)	0.779
	10.1 - 20	70 (51.5%)	66 (48.5%)	

Discussion

Diabetes mellitus is among the world's most common chronic diseases. In 2000, about 10 percent of Egyptians had type-II diabetes, and this number is expected to increase 13.3 percent by 2025.[14] There are two types of complications associated with diabetes: micro-vascular & macro-vascular. Diabetic neuropathy, which is distal peripheral or symmetrical1 neuropathy, is among the most prevalent micro-vascular consequences.[15]

Many studies have been reported to explain1the numerous risk variables influencing peripheral neuropathy development & progression. High blood pressure, cigarette smoking, and hyperlipidemia have all been associated to the development of peripheral neuropathy. Diabetes patients' age, disease duration or poor diabetes control were found to play a role in the development of peripheral1neuropathy. [16, 17]

In this study, the mean MNSI score of patients was 7.54±4.28 and 108 (52.17%) patients were found to have peripheral neuropathy while 99 (47.83%) did not have peripheral neuropathy. This frequency was almost nearer to the frequency reported by Fateh et al.[18] Fateh and colleagues found that the peripheral neuropathy can be detected in about 69% diabetics by using MNSI scoring system.18 But Kasim et al., stated that lower frequency of peripheral neuropathy i.e., 29.70% among diabetics by using MNSI scoring system.[14] But Yeboah et al., presented that the number of peripheral neuropathy was 7.10% among diabetics by using MNSI scoring system.[19]

Frequency of diabetic peripheral neuropathy have been described in 10–50% of patients with diabetes mellitus in Western countries. The frequency of peripheral neuropathy in children with diabetes was 10% in a study conducted in Egypt & Alexandria comprised 20 children with type-II diabetes mellitus.[20] One study showed that the mean score of MNSI was 6.7+2.7 with (minimum 3, maximum 12 points), average HbA1c level was 8.60% (5.81–15.92).[21] As compared to our study, the average MNSI score & HbA1c was 7.53 + 4.21 or 12.16+ 3.71 respectively.

In our study results, we found that duration of diabetes mellitus was 11 years found to be insignificantly associated with DPN. As compared to other study done in Ethiopia, duration of DM was 5 years. Various studies have also been reported in the last 5 years.[9,10,22] This association could be explained by the fact that longer periods of diabetes are caused by chronic hyperglycemia, which

activates several biochemical pathways, causing oxidative stress in patients with diabetes neurons, that leads to damage of nerve & neuronal ischemia, as well as the possibility of late diagnosis. [23]

Conclusion

The frequency of peripheral neuropathy is high in diabetic patients in our local community. The screening of diabetic patients for peripheral neuropathy in routine examination in OPD is suggested. It would lead to an early diagnosis and management.

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Conflict of Interest

The authors declare no conflict of interest.

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Contributions of the Authors

SA, AH, IA devised the plan
IA, AF, HH wrote the manuscript
AM did overall supervision
AM,AH repharsed and did statistical anayses