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## Research Article

### PREVALENCE OF DIABETIC PERIPHERAL NEUROPATHY AND ITS HEALTH RELATED QUALITY OF LIFE AMONG TYPE 2 DIABETES MELLITUS

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Diabetic peripheral neuropathy; health related quality of life; Type 2 diabetes mellitus and Quality of life enhancement module.

#### ABSTRACT

The present study assessed the prevalence of diabetic peripheral neuropathy and its health related quality of life among patients with type 2 diabetes mellitus in a selected hospital, Ernakulam. A total of 110 Type 2 diabetes mellitus patients were screened to assess the prevalence of diabetic peripheral neuropathy by using Michigan neuropathy screening instrument. The study results revealed that 79 type 2 diabetes mellitus patients have moderate prevalence of diabetic peripheral neuropathy, and the quality of life among these 79 diabetic peripheral neuropathy assessed using QOL questionnaire revealed 60% to have moderate quality of life. There is a significant association between prevalence of diabetic peripheral neuropathy and gender, duration of diabetes mellitus and HbA1C value with an obtained  $\chi^2$  values of 7.99, 4.957. There is a significant association between quality of life and gender with an obtained  $\chi^2$  value of 6.181. The development of quality of life enhancement module would help diabetic peripheral neuropathy patients to improve their self esteem and boost up their morale.

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## INTRODUCTION

### Objectives

1. To determine the prevalence of diabetic peripheral neuropathy among patients with type 2 diabetes mellitus.
2. To assess the health related quality of life among patients identified with diabetic peripheral neuropathy.
3. To find the association between prevalence of diabetic peripheral neuropathy and selected demographic variables in patients with type 2 diabetes mellitus.
4. To find the association between quality of life and selected demographic variables in patients identified with diabetic peripheral neuropathy.
5. To develop a quality of life enhancement module for patients identified with diabetic peripheral neuropathy.

### Background

Diabetes Mellitus is a metabolic disease characterized by increased blood glucose (hyperglycemia) resulting from deficiencies in insulin secretion, action or both (American Diabetes Association [ADA]<sup>1</sup>. The Center for Disease Control and Prevention (CDC) reported that in 2005, there were approximately 15 millions of people diagnosed with diabetes and that it was the sixth leading cause of death<sup>2</sup>.

Globally diabetic neuropathy affects approximately 132 million people as of 2010 (1.9% of the population). It is estimated that the prevalence of neuropathy in diabetes mellitus patients is approximately 20% and diabetic neuropathy implicated 50 to 75% of non-traumatic amputations<sup>3</sup>.

A retrospective observational study on quality of life and economic burden of neuropathy in diabetic patients conducted by Happich *et al.* (2002) in Germany showed more than 70% of diabetic neuropathy patients being severely impaired with regard to general physical health related quality of life<sup>4</sup>.

## METHODOLOGY

**Research approach:** Non-experimental quantitative approach.

**Research design:** Descriptive survey design

### Setting

Diabetic clinic of selected hospital, Ernakulam.

### Population

**Target population:** All patients with type 2 diabetes mellitus attending diabetic clinic of selected hospital, Ernakulam

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**Accessible population:** Patients attending diabetic clinic of selected hospital, Ernakulam who are diagnosed with type 2 diabetes mellitus fulfilling the sample selection criteria.

**Sample and Sampling technique**

**Sample:** 110 type 2 diabetes mellitus patients attending diabetic clinic of Lourdes hospital and fulfilling the sample selection criteria.

**Sample size:** 110

Sample size was determined based on a study conducted by Raman kutty et.al(1999) on high prevalence of type 2 diabetes mellitus in an urban settlement in Kerala<sup>5</sup>, by using the formula:  $n > Z^2PQ/d^{2(6)}$ , where P = 16.3%, Q=83.7%, d=7% with a confidence of 93% and concluded that the minimum sample size for this study should be 107.

**Sampling technique:** Convenience sampling technique

**Inclusion criteria**

This study included the patients between the age group 20 to 70 years and diagnosed with type 2 diabetes mellitus over a time period of 5 to 10 years.

**Exclusion criteria**

This study excluded the type 2 diabetes mellitus patients with neurological deficits, diabetic foot ulcers, seriously ill and extremely fatigued.

**Instruments:** Demographic proforma, Michigan neuropathy screening instrument, QOL questionnaire.

**Validity of the tools**

All tools were validated by seven experts: out of which one was validated by diabetologist and rest six by nursing experts. Modifications were made based on their suggestions and tool was finalized. The calculated content validity index for the tool was 0.9.

**Reliability of the tools**

Tool I:-Michigan neuropathy screening instrument was checked by using interclass correlation co efficient and it was found to be 0.8

Tool II:-Quality of life-QOL questionnaire was by Karl Pearson correlation co efficient and it was found to be 0.6.

**Translation of tool**

The tools were translated to Malayalam and validated by an expert in Malayalam and re- translated to English by an expert in English. Modifications on tool carried out based on the expert’s suggestions regarding language.

**Ethical Clearance:** The present study was started after getting ethics clearance from ethics committee of Lourdes College of Nursing, Ernakulam. A written informed consent was obtained from all the participants prior to data collection.

**Data Collection Process**

The study was carried out after getting permission from concerned authorities to conduct the study in diabetic clinic of selected hospital, Ernakulam. Then identified 110 type 2 diabetes mellitus patients who were fulfilling the sample

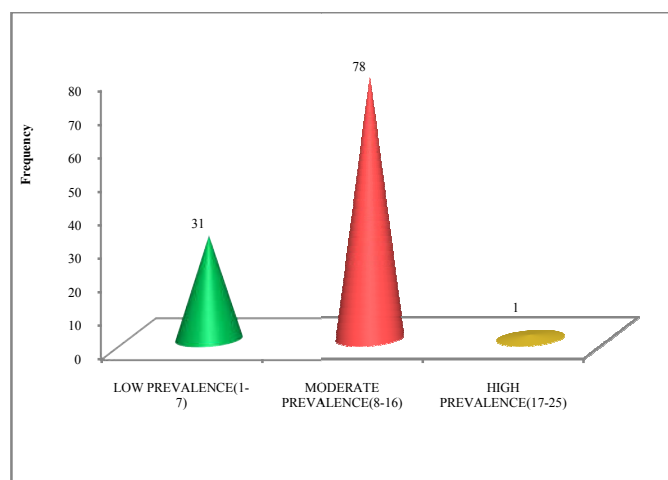
selection criteria by convenience sampling technique. Per day the investigator collected data from 3 to 5 type 2 diabetes mellitus patients and had obtained the sample size of 110 within a month. Collected data regarding of diabetic peripheral neuropathy using Michigan neuropathy screening instrument and health related quality of life among patients identified with diabetic peripheral neuropathy by using QOL questionnaire. Finally developed and distributed health related quality of life enhancement module to patients identified with diabetic peripheral neuropathy. Data were organised, tabulated and analysed with descriptive and inferential statistics. Chi square test was used to find the association between prevalence of diabetic peripheral neuropathy and selected demographic variables and quality of life and selected demographic variables.

**RESULTS**

**Description of sample characteristics**

Variables	Category	Frequency(f)	Percentage (%)
Age	41-60 years	65	59.1
	61-80 years	45	40.9
Gender	Male	43	39.1
	Female	67	60.9
Education	Primary education	58	52.7%
	Higher secondary	20	18.2%
	Graduation	24	21.8%
	Post graduation and above	8	7.3%
Monthly income	<5000	2	1.8
	5000-14999	29	26.4
	15000-24999	31	28.2
	>25000	48	43.6
Family history of diabetes mellitus	Yes	76	69.1%
	No	34	30.9%
Occupation	Sedentary works	69	62.7%
	Heavy works	5	4.5%
	House hold works	36	32.7%

Looking on to duration of diabetes mellitus, 60.9% are in the duration of 6 to 10 years. About 72.7% were taking tablet and 27.3% were on injection (insulin). Majority of subjects, 62.7% were doing sedentary works.



**Figure 1** Prevalence of diabetic peripheral neuropathy

Regarding the HbA1C value, 68.2% subjects had abnormal HbA1C value of >7%. Among patients with type 2 diabetes

mellitus, 24.5% had hypertension, 20.9% had hypercholesteremia, 13.6% had both hypertension and hypercholesteremia, and only 5.5% had cardiac disease and 3.6% had thyroid disease and 31.8% did not have any of these co morbidities.

The data revealed that 28.2% (31) had low prevalence of diabetic peripheral neuropathy, 70.9% (78) had moderate prevalence and 0.9% (1) had high prevalence of diabetic peripheral neuropathy. Thus it was concluded that the patients with both high and moderate prevalence of diabetic peripheral neuropathy to have diabetic peripheral neuropathy. So 79 patients had diabetic peripheral neuropathy as per Michigan neuropathy screening instrument.

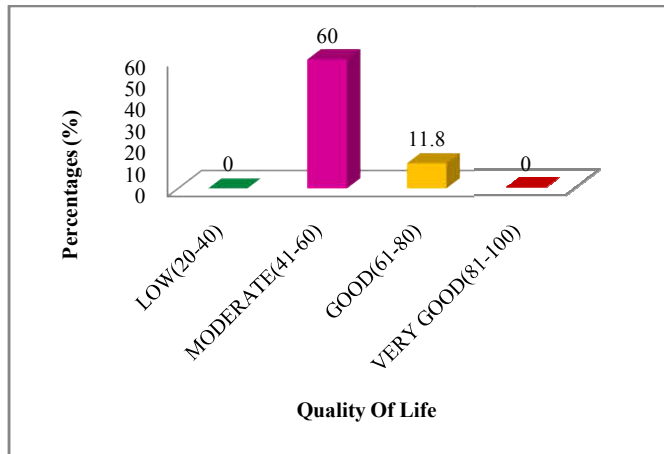


Figure 2 Health related quality of life among patients identified with diabetic peripheral neuropathy.

In this study, data showed that 60% of subjects with diabetic peripheral neuropathy had moderate quality of life and 11.8% had good quality of life and no one was categorized to have low quality of life and very good quality of life.

#### Association between prevalence of diabetic peripheral neuropathy and selected demographic variables in patients with type 2 diabetes mellitus

**Put The corresponding  $\chi^2$  and p value of each variable.** There was significant association between gender ( $\chi^2=7.99$ ,  $p=0.018$ ), duration of diabetes mellitus ( $\chi^2=4.957$ ,  $p=0.028$ ), HbA1C value ( $\chi^2=5.831$ ,  $p=0.048$ ) and prevalence of diabetic peripheral neuropathy. There was no significant association between age ( $p=0.153$ ,  $\chi^2=3.760$ ), education ( $p=0.307$ ,  $\chi^2=1.277$ ), monthly income ( $p=0.117$ ,  $\chi^2=3.656$ ), family history of diabetes mellitus ( $p=0.178$ ,  $\chi^2=3.457$ ), type of medication ( $p=0.147$ ,  $\chi^2=3.839$ ), occupation ( $p=0.089$ ,  $\chi^2=6.182$ ), co morbidities ( $p=0.281$ ,  $\chi^2=2.399$ ) and prevalence of diabetic peripheral neuropathy. The obtained  $\chi^2$  values were not statistically significant at 0.05 level.

#### Association between quality of life and selected demographic variables in patients identified with diabetic peripheral neuropathy

There was significant association between gender and quality of life among patients identified with diabetic peripheral neuropathy,  $\chi^2$  value was statistically significant at the level of 0.05 ( $\chi^2=6.181$ ,  $p=0.013$ ). There was no significant association between age ( $p=0.206$ ,  $\chi^2=1.600$ ), education

( $p=0.754$ ,  $\chi^2=0.098$ ), monthly income ( $p=0.467$ ,  $\chi^2=0.528$ ), family history of diabetes mellitus ( $p=0.356$ ,  $\chi^2=0.852$ ), duration of diabetes mellitus ( $p=0.141$ ,  $\chi^2=2.165$ ), type of medication ( $p=0.488$ ,  $\chi^2=0.481$ ), occupation ( $p=0.106$ ,  $\chi^2=2.613$ ), HbA1C value ( $p=0.709$ ,  $\chi^2=0.140$ ), co morbidities ( $p=0.306$ ,  $\chi^2=1.047$ ) and quality of life.

#### Develop a quality of life enhancement module for patients identified with diabetic peripheral neuropathy

The researcher developed a quality of life enhancement module based on the findings of the study which was concentrated on four areas of physical domain, psychological domain, social domain and environmental domain and distributed to patients with diabetic peripheral neuropathy, with an intention to improve the physical, psychological, spiritual functioning and will prevent the occurrence of diabetic peripheral neuropathy among patients with type 2 diabetes mellitus.

## DISCUSSION

**Objective 1:** To determine the prevalence of diabetic peripheral neuropathy among patients with type 2 diabetes mellitus.

In the present study, 0.9 % (1) had high prevalence of diabetic peripheral neuropathy, 70.9 % (78) had moderate prevalence and 28.2% (31) had low prevalence.

The above findings are supported by a study to estimate the prevalence of diabetic peripheral neuropathy and associated risk factors among 1401 type 2 diabetes mellitus patients in Chennai metropolis conducted by Padmaja *et al.*(2010) using vibration perception threshold concluded that the prevalence of diabetic peripheral neuropathy was moderate (7.9%)<sup>7</sup>.

A cross sectional study to assess the prevalence of diabetic peripheral neuropathy among 638 known diabetes mellitus and 153 newly detected diabetes mellitus patients in Endocrinology clinic of a public tertiary care hospital, Mohali, India conducted by Gudala *et al.* (2014) using vibration perception threshold showed that 37.9% subjects had diabetic peripheral neuropathy. The prevalence of mild neuropathy was 10.14%, moderate neuropathy was 18.9% and severe neuropathy was 8.6%. Female gender and duration of diabetes mellitus are significantly associated with p values of 0.001<sup>8</sup>.

**Objective 2:** To assess the health related quality of life among patients identified with diabetic peripheral neuropathy

Out of 110 type 2 diabetes mellitus patients 79 subjects had diabetic peripheral neuropathy and 66(60%) had moderate quality of life and 13(11.8%) had good quality of life.

Above findings are supported by a study to assess the health related quality of life in 53 diabetic peripheral neuropathy patients attending two outpatient clinics of Department of Internal Medicine ,Research Institute and Diabetes Centre and School of Medicine , University of Athens conducted by Georgios *et al.* (2013) using random sampling technique and data were collected by SF-12 questionnaire and Michigan neuropathy screening instrument showed that patients with diabetic peripheral Neuropathy had significantly lower health related quality of life<sup>10</sup>.

A study to assess the health related quality of life among 41 patients with diabetic peripheral neuropathy in adult hospital

diabetic clinic, UK conducted by Benbow *et al.* (1998) using clinical history, examination, Nottingham Health Profile for quality of life assessment revealed that patients with diabetic peripheral neuropathy had reduced quality of life.

**Objective 3:** Association between prevalence of diabetic peripheral neuropathy and selected demographic variables in patients with type 2 diabetes mellitus

To find the association between diabetic peripheral neuropathy and selected demographic variables, chi square test was carried out. Statistical analysis revealed that there were significant association between prevalence of diabetic peripheral neuropathy and gender, duration of diabetes mellitus and HbA1C value with an obtained  $\chi^2$  values of 7.99, 4.957 and 5.831 which was statistically significant at the level of 0.05 with corresponding p values of 0.018, 0.028 and 0.048.

A study to determine the prevalence of diabetic peripheral neuropathy among 208 diabetic patients attending tertiary care Wenlock hospital, Mangalore, India conducted by Monisha *et al.* (2015) using Michigan neuropathy screening instrument concluded that the prevalence of diabetic peripheral neuropathy was 18.3%. The major determinants associated with diabetic peripheral neuropathy was gender (p value=0.046,  $\chi^2=2.7$ ) and age of more than 40 years (p value= 0.011,  $\chi^2=1.7$ )<sup>11</sup>.

A study to assess the prevalence and risk factors of diabetic peripheral neuropathy among 1637 known diabetes mellitus and 369 newly detected diabetes mellitus in an outpatient setting of an endocrinology clinic of a public tertiary care hospital in North India conducted by Dipika *et al.*(2014) using monofilament, ankle reflexes and vibration perception threshold revealed prevalence of mild, moderate and severe neuropathies was 8.06,14.55 and 6.63 and there is a significant association between prevalence of diabetic peripheral neuropathy and duration of diabetes mellitus (p value: 0.001,  $\chi^2$  value :7.5 ) and HbA1C value (p value:0.001,  $\chi^2=8.8$ )<sup>12</sup>.

**Objective 4:** Association between quality of life and selected demographic variables in patients identified with diabetic peripheral neuropathy

Chi square test was computed to find the association between quality of life and selected demographic variables. Data showed that there was significant association between quality of life and gender with an obtained  $\chi^2$  value of 6.181 which was statistically significant at 0.05 level with corresponding p value of 0.013<sup>13</sup>.

A cross sectional study to evaluate the gender differences in impact of self reported diabetes and neuropathy on quality of life in 21756 Romanian patients conducted by Bondor *et al.* (2012) using Norfolk QOL-DN questionnaire showed that diabetes has a greater impact on quality of life and neuropathy and its complications have worsened quality of life in both gender with a p value of <0.001 and  $\chi^2$  value of 3.81.35

**Objective 5:** Develop a quality of life enhancement module for patients identified with diabetic peripheral neuropathy. Present study aimed to develop a quality of life enhancement module for patients identified with diabetic peripheral neuropathy so that it would help them to improve their self esteem and boost up their morale.

## CONCLUSION

The results of the study concludes that 60.9% of type 2 diabetes mellitus patients were females in the age group of 41 to 60 years having the duration of diabetes 6 to 10 years. Among Type 2 diabetes mellitus patients 70.9% had moderate prevalence of diabetic peripheral neuropathy. Quality of life among patients identified with diabetic peripheral neuropathy revealed 60% had moderate quality of life. There were significant association between prevalence of diabetic peripheral neuropathy and gender, duration of diabetes mellitus and HbA1C value. Data showed that there was significant association between quality of life and gender.

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