International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

A Study to Assess the Risk of Peripheral Neuropathy among Diabetic Clients with a View to Develop an Informational Booklet in Selected Hospitals in Guwahati, Assam

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Abstract: ***Background of the study: Diabetic peripheral neuropathies are a variety of syndromes which affect sensory, autonomic and motor nerve function. It is estimated that globally 220 million people will have diabetes, and epidemiological studies estimate that more than 50% of diabetic patient with a 25 years history will develop diabetic peripheral neuropathies. Objectives: To assess the risk of Peripheral Neuropathy among Diabetic clients. Methods: A descriptive survey research design was adopted, 50 samples of Diabetic clients either in-patient or out-patient department in Rahman Hospitals Pvt. Ltd, Guwahati, Assam were recruited as sample of the study using non probability purposive sampling technique. Result: Chi-square test shows thatthere was a significant association between risk of peripheral neuropathy with selected demographic variables like education, nature of work, current treatment and no significant association with respect to age, gender, marital status, occupation, religion, type of family, area of living, socio-economic status per capita (According to Prasad's Scale 2019), smoking, alcohol, advice received on self care. There was a significant association between risk of peripheral neuropathy with selected clinical variables like family history of diabetes and no significant association with respect to duration of diabetes, use of injection (insulin) medication, oral hypoglycaemic agents (OHA), use of anti-hypertensive medication, current blood sugar level (FBS, PPBS, HBA1C), thyroid, blood pressure, BMI, presence of diabetic wound, co-morbidity. There was a significant association between risk of peripheral neuropathy with selected demographic variables like nature of work and no significant association with respect to age, gender, marital status, education, occupation, religion, type of family, area of living, socio economic status per capita (According to Prasad's scale 2019), current treatment, smoking, alcohol, advice received on self-care. There was a significant association between risk of peripheral neuropathy with selected clinical variables like PPBS, co-morbidity and no significant association with respect to duration of diabetes, use of injection (insulin) medication, oral hypoglycemic agents (OHA), use of Anti-hypertensive medication, current blood sugar level (FBS, HBA1C), thyroid, blood pressure, BMI, presence of diabetic wound, family history of diabetes. Conclusion: The study revealed that, Risk of Peripheral Neuropathy among Diabetic clients had low risk, moderate risk and high risk Therefore, there is need of treatment and awareness to prevent from further consequences.***

Keywords: Assess, Risk of Peripheral Neuropathy, Diabetic Clients, Informational booklet

1. Introduction

"*Health is the greatest of human blessings.*

-Hippocrates

Diabetic peripheral neuropathies are a variety of syndromes which affect autononomic, sensory and motor nerve function. The prevalence rate estimated that globally 220 million people will have diabetes, and epidemiological studies estimate that more than 50% of diabetic patient with a 25 years history will develop diabetic peripheral neuropathies.[1]

Diabetes has become an epidemic problem in the 21st century. According to International Diabetes Federation, the global population of diabetes case is predicted to reach a level of 366 million by 2030, double the number from 2000.[2]Peripheral neuropathy is the most common chronic complications and often occurs in diabetes mellitus. Peripheral neuropathy can cause morbidity, decrease quality of life and mortality.[3] Diabetes mellitus can affect various part of the body with varying manifestation among different people. This complication can lead to disability; reduce quality of life and pre-mature death. It also affects all peripheral nerve with an annual incidence of 2% population of 220 million estimated global cases of diabetes by the year 2010, DPN is likely to affect many as 110 million people worldwide.[4] According to the study conducted by Indian Council of Medical Research(ICMR) India Diabetes study reported that in blood sugar level >140mg/dl the urban women show the highest blood glucose level(9.4%) in both Mizoram and Tripura which is followed by Manipur with (8.8%) and Sikkim with (7.8%). Whereas in case of men the highest blood glucose level can be seen in Nagaland (11.1%) followed by Mizoram and Sikkim with (10.7%) there is high prevalence of Type2 diabetes among the overweight and obese group. In some states male show higher prevalence and in other female show higher.[5]The current studies suggest that the risk factors of peripheral neuropathy is common with diabetes patients and identifying the modifiable risk factors for the development of Peripheral Neuropathy and effectively controlling them at an early stage is critical for the successful management of diabetes and preventing serious Diabetic Peripheral Neuropathy related

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consequences. Thus, the present researcher felt the need of assessing the risk of peripheral neuropathy among diabetic clients

2. Review of Literature

Section I: Studies related to Diabetes Mellitus.
Section II: Studies related to Peripheral Neuropathy.
Section III: Studies related to Risk of Peripheral Neuropathy among diabetic client.
Section IV: Studies related to effectiveness of informational booklet.

Section I: Studies related to Diabetes Mellitus:

Harini S, Bhagya V (2018)A study conducted on Diabetes mellitus and Cognition- A non invasive study**.** among 60 diabetic patients, attending medical outpatient department of Bapuji and Chigateri hospital, Davangere. Aim and objectives of this study is to investigate neuro physiological alterations of higher brain functions in patients with diabetes mellitus. Methods used in this study were auditory P300 event related potentials were recorded in diabetic patients. Results shown that Diabetics has significantly longer P300 latencies and reduced P300 amplitudes than control subjects. There was a positive correlation between prolongation of latencies and duration of diabetes mellitus.[6]

Kumar KN, Katkuri S, Ramyacharitha I (2018) A study conducted to assess prevalence of diabetes mellitus and its associated risk factors among adult residents of rural Khammam, district in Telangana. Methods used in the study are a community based cross sectional study. Results shown near about 74 (8.1%) were diagnosed as type-2 diabetes mellitus. The prevalence of DM was 16.22% in 30-40 years age group and 16.2% in 61-70 years age group which shown that DM increases with age and the association between age and prevalence of type 2DM was found to be statistically significant. The study concluded that there is a need to increase awareness of type-2DM in the general population.[7]

Section II: Studies related to Peripheral Neuropathy

Kumar SMH, Moosabba MS, Koppad SN (2018)A study conducted on Peripheral Neuropathy in patients with diabetic foot ulcers among 62 diabetic foot patients residing in Karnataka. Methods used in this study is a total of 62 diabetic foot patients admitted in general surgery department of Yenepoya medical college and hospital undergo neurological examination. Patients who were having peripheral neuropathy with diabetic foot ulcer between 18 and 85 years of women were included in the study. Results shown that 62 patients with diabetic foot ulcers, 50 were unilateral and 12 were bilateral among which 8 patients had undergone toe amputation prior to examination. Patients were predominantly male 48 (77.4%). There were 14 women and 48 men with an average duration of diabetics being 15.6 and 14.8 years respectively. The study concluded that Diabetes Mellitus lead to neuropathies of more than one type and all contribute to diabetic foot pathogenesis. Clinical symptoms and signs, as well as nerve conduction studies may be different between men and women diabetic foot.[8]

Siddiqui S, Mustafavi S, Yousra T, Mohammad S, Husayni S(2019)A study conducted on Prevalence of Diabetic peripheral neuropathy in diabetic foot infection and clinical response of Clindymycin in Diabetic Peripheral Neuropathy positive Diabetic foot infection patients residing in Hyderabad. Method used in these study was an observational study in which recruited patients >18years of age, with Diabetic foot infection. Detailed history of patient and clinical examination of all patients are taken at admission. The status of diabetic patients including neuropathy, antibiotic therapy along with glycemic control were recorded. Results shown that higher number of patients were found in 50-70years age group which compromised of 16 (59%) of diabetic peripheral neuropathy in diabetic foot infection patients was found to be 63%. The study concluded that DPN positive patients require higher duration of antibiotic therapy and individualized regimen to improve wound healing and reduce the risk ofamputation.[9]

Section III: Studies related to Risk of Peripheral Neuropathy among diabetic client.

Begum S, Venkatesan M, Ganapathy K (2019) A study conducted on foot care practices, its barriers and risk of peripheral neuropathy among diabetic patient attending medical college in rural Puducherry. Methods used in this study were a mixed methods study conducted among diabetic patients attending OPD. Results shown that the prevalence of peripheral neuropathy among the study participants was 52.9%. significant association was found between peripheral neuropathy and male sex(p=0.06) occupation(p=0.03), smoking status (p=0.13) and longer duration of disease (p=0.04) The various reasons for poor foot care practices perceived by patients were poor knowledge about foot hygiene, lack of knowledge about the complications of disease and lack of awareness about the disease. The study concluded that the prevalence of peripheral neuropathy is common among diabetic patients and most of the patients are having poor foot care practices so there is a need in the community to lay emphasis on health education programs to improve foot care practices.[10]

AleidanFAS, Ahmad BA, Alotaibi FA, Aleesa DH, AlhefdhiNA, Badri M. et.al. (2020) A study conducted on the prevalence and the risk factors of diabetic peripheral neuropathy (DPN) in hospitalized adult Saudi diabetics. The methods used in this study is a retrospective, nested case-control study conducted at King Abdulaziz Medical City (KAMC) in Riyadh, Saudi Arabia. Results shown that a total of 2,096 adult diabetic patients were identified during the study period. Of these, 73 patients (3.5%) were confirmed to be suffering from DPN and 219 were included as controls. The study identified several risk factors that contributed to the development of DPN in Saudis. These must be considered in strategies and aimed at risk reduction of cardiovascular and

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chronic diseases and consequently progression ofDPN.[11]

Section IV: Studies related to effectiveness of Informational Booklet

Silva EQ, Suda EY, Santos DP, Verissimo JL, Ferreira JSSP, Cruvinel Junior RH. et.al (2020)A study conducted on the effectiveness of an educational booklet for prevention and treatment of foot musculoskeletal dysfunction in people with diabetic peripheral neuropathy. Methods used in this study has been designed as a single –blind, two –parallel –arm randomized controlled trial. selected samplewas 48patients with DPN who will be randomly allocated to a control (recommended foot care by international consensus with no foot exercises) group of an intervention (foot-related exercises using an educational booklet three times/week at home for 8weeks) group. This study concluded that the booklet is a management tool that allows users to be autonomous in their treatment by choosing how and where to perform exercises. This allows the patients to perform the exercise regularly and continuous habit of foot care practices which is an important element in the management of the diabetic foot. An informational booklet focuses on specific foot-ankle exercises; we expect that it will improve the clinical aspects of DPN and produce beneficial biochemical changes during gait, becoming a powerful self-management tool that can be easily implemented to improve the performance of daily livingtasks.[12]

Sallam SAEIG, Edison JS (2019)A study conducted on effect of Nursing instructions on Diabetic Patients' Knowledge about Peripheral Neuropathy and Foot Care. Diabetic peripheral neuropathy occurs in nearly half of the diabetic patients and increases the risk of foot problems The aim is to assess the effect of nursing instructions on diabetic patients' Knowledge about peripheral neuropathy and foot care. Methods used in this study is A quasi experimental research design was used Sample used in this study is a purposive sample was used to select 60 adult diabetic patients. Results shown that there was a highly statistically significant improvement of the studied group total knowledge about diabetic peripheral neuropathy and foot care practices after one week and after three months of intervention than pre intervention. The study concluded that implementation of nursing instructions regarding peripheral neuropathy and foot care was effective in improving diabetic patients' knowledge about them.[13]

3. Methodology

The objective is to assess the risk of peripheral neuropathy among diabetic clients and to find the association between risk of peripheral neuropathy with selected demographic variables and other clinical variables and also to develop an informational booklet on diabetic peripheral neuropathy.

Research approach adopted for the study was quantitative approach with descriptive survey research design. The study was conducted in Rahman Hospitals Pvt. Ltd., Guwahati, Assam for a period of one month. A total sample of 50 diabetic clients who are treated in in-patient and out-patient department were selected by using non-probability purposive sampling technique. The data were collected by using demographic variables, clinical variables, diabetic neuropathy risk assessment checklist and technique used was paper and pencil.

Formal Permission was obtained from the concerned authorities of Rahman Hospitals Pvt. Ltd. The data were collected for one month from 50 diabetic clients either in-patient and out-patient department at Rahman Hospitals Pvt. Ltd, Guwahati, Assam. The investigator had given a self –introduction, explained the purpose of the study and ascertained the willingness of the subjects to participate in the study. The subjects were assured and confidentiality of the information provided by them and informed consent was obtained. The Data was collected by the investigator personally by using observational checklist through diabetic neuropathy risk assessment checklist an informational booklet on diabetic peripheral neuropathy was distributed to the subjects free of cost.

Plan for data analysis:

(1) Descriptive statistics:
Collected Data will be analyzed by using Descriptive Statistics such as frequency and percentage, mean, standard deviation.

(2) Inferential statistics:
The association between risk of peripheral neuropathy with selected demographic variables and other clinical variables will be tested by X^2 test.

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4. Results

Section A: Description of frequency and percentage distribution of diabetic clients according to demographic variables.

Table 1: Frequency and percentage distribution of Diabetic Clients according to Demographic Variables, n= 50

S. No.	Demographic Variables	Groups	Frequency	Percentage
1.	Age	31-40 years	4	8%
		41-50years	11	22%
		51-60years	16	**32%**
		61-70 years	12	24%
		71-80 years	6	12%
		81-90 years	1	2%
2.	Gender	Male	26	**52%**
		Female	24	48%
		Transgender	0	0
3.	Marital Status	Married	40	**80%**
		Unmarried	7	14%
		Divorced/Separated	0	0
		Widow/Widower	3	6%
4.	Education	Under Matriculate	18	**36%**
		10th Pass	14	28%
		12th Pass	7	14%
		Graduate	8	16%
		Post Graduate	3	6%
5.	Nature of work	Sedentary	15	30%
		Moderate Physical activity	23	**46%**
		Active work – Labourers/Farmers	12	24%
6.	Occupation	Employed	7	14%
		Not Employed	5	10%
		Retired	8	16%
		Business	14	28%
		Daily wages	1	2%
		Self Employed	15	**30%**
		Others	0	0%
7.	Religion	Hindu	17	34%
		Muslim	32	**64%**
		Christian	1	2%
		Others	0	0%
8.	Type of family	Joint family	34	**68%**
		Nuclear family	16	32%
9.	Area of living	Urban	21	42%
		Rural	29	**58%**
10.	Socio-economic status per capita (According to Prasad's Scale)	Upper class-(Rs 7008 and above)	3	6%
		Upper middle class	9	18%
		Middle class	29	**58%**
		Lower middle class	8	16%
		Lower	1	2%
11.	Current treatment	OPD	15	30%
		IPD	35	**70%**
12.	Smoking	Light Smoker (1 to 5 times per week)	0	0
		Moderate Smoker (6 to 15 times per week)	0	0
		Heavy Smoker (16 to 25 times per week)	1	2%
		Very Heavy Smoker (Above 25 times per week)	0	0
		Non Smoker	49	**98%**
13.	Alcohol	1 to 5 times per month	0	0
		6 to 15 times per month	0	0
		16 to 25 times per month	0	0
		Daily	1	2%
		Not taken	49	**98%**
14.	Advice received on self care	Yes	50	**100%**
		No	0	0

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The data in Table 1. shows that majority of the diabetic clients 16(32%) belonged to age group of 51-60 years, about gender majority 26 (52%) were male. about marital status majority 40 (80%) were married. about education majority 18 (36%) were under matriculation. About the nature of work majority 23 (46%) have moderate physical activity. In occupation, majority 15 (30%) are self employed. Religion wise, majority 32 (64%) is Muslim. 34 (68%) are from joint family type. 29 (58%) are from rural area. regarding socio-economic status per capita According to prasad's Scale (2019), majority 29 (58%) came from middle class family. majority 35 (70%) is from IPD. majority 49 (98%) are non-smoker and 49 (98%) did not have a habit of alcohol consumption and All 50 (100%) received an advice on self care.

Section B: Description of frequency and percentage distribution of diabetic clients according to clinical variables

Table 2: Frequency and Percentage Distribution of Diabetic Clients according to Clinical Variables, n = 50

S. No.	Clinical Variables	Groups	Frequency	Percentage
1.	Duration of Diabetes	2-6 years	41	**82%**
		7-11 years	7	14%
		12-16 years	2	4%
2.	Use of injection (insulin) Medication	1-3 years	19	38%
		4-6 years	9	18%
		More than 6 years	2	4%
		No	20	**40%**
3.	Oral Hypoglycemic Agents (OHA)	1-4 years	28	**56%**
		5-8 years	18	36%
		More than 8 years	4	8%
		No	0	0
4.	Use of Anti-Hypertensive Medication	1-4 years	13	26%
		5-8 years	13	26%
		More than 8 years	2	4%
		No	22	**44%**
5.	Current blood sugar level			
	a) FBS	Less than 100mg/dl	0	0
		From 100 to 125 mg/dl	3	6%
		More than 126 mg/dl	47	**94%**
	b) PPBS	< 139 mg/dl	5	10%
		From 140 mg/dl to 199 mg/dl	23	**46%**
		More than 200 mg/dl	22	44%
	c) HBA1C	Below 5.7%	9	18%
		Between 5.7% and 6.4%	23	**46%**
		HBA1C of 6.5% or higher	18	36%
6.	Thyroid	> 4.5 mU/L (High)	7	14%
		0.45 - 4.5 mU/L (Normal)	37	**74%**
		< 0.45 mU/L (Low)	6	12%
7.	Blood pressure	≤ 90 mmHg (Systolic) or≤ 60 mmHg (Diastolic) (Hypotension)	0	0
		≤100 mmHg (Systolic) or ≤ 65 mmHg (Diastolic) (Low Normal)	4	8%
		≤ 120 mmHg (Systolic) or ≤80 mmHg (Diastolic) (Normal)	20	**40%**
		≤140 mmHg (Systolic) or ≤90 mmHg (Diastolic) (High Normal)	9	18%
		≤ 160 mmHg (Systolic) or ≤ 100 mmHg (Diastolic) (Hypertension Mild stage –I)	15	30%
		>160 mmHg (Systolic) or >110 mmHg (Diastolic) (Hypertension Moderate Stage –II) (Requires Treatment)	2	4%
8.	BMI	18.5 - 24.9 (Normal weight)	30	**60%**
		<18.5 (Underweight)	0	0
		25 – 29.5 (Over weight)	19	38%
		30 – 34.9 (Obese)	1	2%
		> 35 (Extremely Obese)	0	0
9.	Presence of diabetic wound	Yes	0	0%
		No	50	**100%**
10.	Family history of diabetes	Father	2	4%
		Mother	3	6%
		Both Father and Mother	7	14%
		Grandfather	1	2%
		Grandmother	1	2%
		Both Grandfather and Grandmother	1	2%
		No	35	**70%**

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11.	Co-Morbidity	Hypertension	12	24%
		Thyroid disorder	5	10%
		Renal disease	2	4%
		History of stroke	10	20%
		No co-morbidity	21	**42%**

The data in Table 2. Shows that in duration of diabetes, majority 41 (82%) of the diabetic clients are having diabetes since 2-6 years. Near half 20 (40%) of the diabetic clients do not use injection (insulin) medication. majority 28 (56%) of the diabetic clients use Oral Hypoglycemic Agents (OHA) for 1-4 years. Majority 22 (44%) of the diabetic clients do not use Anti-hypertensive medication. About current blood sugar level, most 47 (94%) of the diabetic clients are having FBS level more than 126 mg/dl (7mmol/L), near half 23 (46%) of the diabetic clients are having PPBS level from 140 mg/dl to 199 mg/dl followed by near half 23 (46%) of the diabetic clients are having HBA1C between 5.7% and 6.4%. In case of thyroid, most of 37 (74%) of the diabetic clients are having normal thyroid level. Regarding blood pressure, majority 20 (40%) of the diabetic clients are having normal blood pressure. About BMI, majority 30 (60%) of the diabetic clients are having normal BMI. About the presence of diabetic wound, all 50 (100%) of the diabetic clients do not present diabetic wound. In case of family history of diabetes, most 35 (70%) of the diabetic clients do not have family history of diabetes. Regarding co-morbidity, near half 21 (42%) of the diabetic clients has no co-morbidities.

Section C: Risk Assessment of Diabetic Neuropathy of Diabetic Clients

Table 3: Distribution of Diabetic Clients based on subjective data regarding risk of Diabetic Neuropathy, n = 50

S. No.	Items	Yes		No	
		Frequency	Percentage	Frequency	Percentage
1.	Numbness				
	1.1 Upper limb				
	a. Left side	23	46%	27	54%
	b. Right side	20	40%	30	60%
	1.2 Lower limb				
	a. Left side	26	52%	24	48%
	b. Right side	25	50%	25	50%
2.	Pain				
	2.1 Upper limb				
	a. Left side	35	70%	15	30%
	b. Right side	33	66%	17	34%
	2.2 Lower limb				
	a. Left side	40	80%	10	20%
	b. Right side	40	80%	10	20%
3.	Burning sensation				
	3.1 Upper limb				
	a. Palm	15	30%	35	70%
	b. Fingers	16	32%	34	68%
	3.2 Lower limb				
	a. Sole	27	54%	23	46%
	b. Toes	25	50%	25	50%
4.	Tingling sensation				
	4.1 Upper limb				
	a. Left side	22	44%	28	56%
	b. Right side	22	44%	28	56%
	4.2 Lower limb				
	a. Left side	37	74%	13	26%
	b. Right side	37	74%	13	26%
5.	Dietary habits				
	a. Low carbohydrates diet	50	100%	0	0%
	b. Low fats diet	50	100%	0	0%
	c. Low protein diet	50	100%	0	0%
	d. Avoid caffeine	50	100%	0	0%
	e. Low salt diet	50	100%	0	0%
	f. Low sugar diet	50	100%	0	0%
6.	Physical activity				
	a. Morning exercise	29	58%	21	42%
	b. Evening exercise	25	50%	25	50%

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The data in Table 3: It indicates that, Numbness of upper limb (left side) is absent in 27 (54%) of the diabetic clients, numbness of upper limb (right side) is absent in 30 (60%) of the diabetic clients, numbness of lower limb (left side) is present in 26 (52%) of the diabetic clients, numbness of lower limb (ride side) is present in 25 (50%) of the diabetic clients and numbness of lower limb (right side) is absent in 25 (50%) of the diabetic clients, Pain of upper limb (left side) is present in 35(70%) of the diabetic clients, Pain in upper limb (right side) is present in 33 (66%) of the diabetic clients, Pain in lower limb (left side) is present in 40 (80%) of the diabetic clients, Pain in lower limb (right side) is present in 40 (80%) of the diabetic clients, Burning sensation of upper limb (palm) is absent in 35 (70%) of the diabetic clients, burning sensation of upper limb (fingers) is absent in 34 (68%) of the diabetic clients, burning sensation of lower limb (sole) is present in 27 (54%) of the diabetic clients, burning sensation of lower limb (toes) is present in 25 (50%) of the diabetic clients and burning sensation of lower limb (toes) is absent in 25 (50%) of the diabetic clients, tingling sensation of upper limb (left side) is absent in 28 (56%) of the diabetic clients, tingling sensation of upper limb (right side) is absent in 28 (56%) of the diabetic clients, tingling sensation of lower limb (left side) is present in 37 (74%) of the diabetic clients, tingling sensation of lower limb(right side) is present in 37 (74%) of the diabetic clients, Regarding dietary habits, 50 (100%) of diabetic clients maintained dietary habits. About physical activity, 29 (58%) of diabetic clients maintain morning exercise. While 25 (50%) of diabetic clients do not maintain evening exercise.

Table 4: Distribution of Diabetic Clients based on objective data regarding risk of Diabetic Neuropathy, n = 50

Sl. No.	Items	Yes		No	
		Frequency	Percentage	Frequency	Percentage
1.	Loss of sensation				
	1.1 Upper limb				
	1.1.1 Left side				
	a. Light touch	22	44%	28	56%
	b. Temperature	22	44%	28	56%
	c. Pain	22	44%	28	56%
	d. Vibratory sensation	22	44%	28	56%
	1.1.2 Right side				
	a. Light touch	12	24%	38	76%
	b. Temperature	12	24%	38	76%
	c. Pain	12	24%	38	76%
	d. Vibratory sensation	12	24%	38	76%
	1.2 Lower limb				
	1.2.1 Left side				
	a. Light touch	23	46%	27	54%
	b. Temperature	23	46%	27	54%
	c. Pain	23	46%	27	54%
	d. Vibratory sensation	24	48%	26	52%
	1.2.2 Right side				
	a. Light touch	14	28%	36	72%
	b. Temperature	14	28%	36	72%
	c. Pain	14	28%	36	72%
	d. Vibratory sensation	16	32%	34	68%
2.	Muscle weakness				
	2.1 Upper limb				
	2.1.1 Left side	35	70%	15	30%
	2.1.2 Right side	34	68%	16	32%
	2.2 Lower limb				
	2.2.1 Left side	36	72%	14	28%
	2.2.2 Right side	36	72%	14	28%
3.	Deformities				
	a. Hammer toes	0	0%	50	100%
	b. Claw toes	0	0%	50	100%
	c. Mallet toes	0	0%	50	100%
4.	Gangrene				
	4.1 Left	0	0%	50	100%
	4.2 Right	0	0%	50	100%
5.	Foot infection				
	5.1 Left side	0	0%	50	100%
	5.2 Right side	0	0%	50	100%

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The data in Table 4 represent. It indicates that, Loss of sensation upper limb left side (light touch, temperature, pain, vibratory sensation) is absent in majority 28 (56%) of diabetic clients, loss of sensation upper limb right side (light touch, temperature, pain, vibratory sensation) is absent in 38 (76%) of diabetic clients, loss of sensation lower limb left side (light touch, temperature, pain) is absent in majority 27 (54%) of diabetic clients, loss of sensation lower limb left side (vibratory sensation) is absent in majority 26 (52%) of diabetic clients, loss of sensation lower limb right side (light touch, temperature, pain) is absent in 36(72%) of the diabetic clients, loss of sensation lower limb right side (Vibratory Sensation) is absent in 34(68%) of the diabetic clients, muscle weakness of upper limb (left side) is present in most 35 (70%) of diabetic clients, muscle weakness of lower limb (right side) is present in most 34(68%) of diabetic clients, muscle weakness of lower limb (left side) is present in majority 36 (72%) of diabetic clients, muscle weakness of lower limb right side is present in 36(72%) of diabetic clients, Deformities (Hammer toes, Claw toes and Mallet toes) is absent in 50(100%) of the diabetic clients, Gangrene of foot (left side and right side) is absent in 50(100%) of the diabetic clients, Foot infection (left side and right side) has not present in 50(100%) of diabetic clients.

Table 5: Frequency and percentage distribution of risk of Peripheral Neuropathy of Diabetic Clients, n=50

Sl. No.	Risk Status Score	Frequency	Percentage
1.	Low risk (0-26)	25	50%
2.	Moderate risk (27-53)	25	50%
3.	High risk (54-79)	0	0

The above Table 5. depicts that most 25 (50%) of diabetic clients had low risk, most 25 (50%) of diabetic clients had moderate risk and high risk 0(0%) on risk of Peripheral Neuropathy.

Table 6: Frequency and percentage distribution of risk of Peripheral Neuropathy of Diabetic Clients based on subjective data regarding risk of Peripheral Neuropathy, n=50

Sl. No.	Risk Status Score	Frequency	Percentage
1.	Low risk (0-8)	5	10%
2.	Moderate risk (9-17)	26	**52%**
3.	High risk (18-24)	19	38%

The above Table 6. depicts that 5 (25%) of diabetic clients had low risk, most there and 19 (38%) of diabetic clients had high risk on risk of Peripheral Neuropathy.

Table 7: Frequency and percentage distribution of risk of Peripheral Neuropathy of Diabetic Clients based on objective data regarding risk of Peripheral Neuropathy, n=50

Sl. No.	Risk Status Score	Frequency	Percentage
1.	Low risk (0-18)	40	**80%**
2.	Moderate risk (19-37)	10	20%
3.	High risk (38-55)	0	0

The above Table 7. depicts that most 40 (80%) of diabetic clients had low risk, 10 (20%) of diabetic clients had moderate risk and 0 (0%) of diabetic clients had high risk on risk of Peripheral Neuropathy.

Table 8: Range of scores, mean and standard deviation of Diabetic Clients on Risk of Diabetic Neuropathy, n=50

Risk Status	Range of scores	Mean	SD	Total score
Risk of Diabetic Neuropathy	8-44	26.34	9.50	79

The above Table 8. Shows that the range of scores on diabetic neuropathy was from 8-24, with mean 26.34 and standard deviation was 9.50.

Table 9: Range of scores, mean and standard deviation of Diabetic Clients based on Subjective Data on Risk of Diabetic Neuropathy, n=50

Risk Status	Range of scores	Mean	SD	Total score
Risk of Diabetic Neuropathy	8-24	15.94	4.00	24

The above Table 9. Shows that the range of scores on diabetic neuropathy was from 8-24, with mean 15.94 and standard deviation was 4.00.

Table 10: Range of scores, mean and standard deviation of Diabetic clients based on Objective Data on Risk of Diabetic Neuropathy, n=50

Risk Status	Range of scores	Mean	SD	Total score
Risk of Diabetic Neuropathy	0-26	10.36	8.29	55

The above Table 10. Shows that the range of scores on diabetic peripheral neuropathy was from 0-26, with mean 10.36 and standard deviation was 8.29.

Section D: Association between risk of Peripheral Neuropathy with selected demographic variables and other clinical variables

Table 11: Chi square test to find out the association between risk of Peripheral Neuropathy of Diabetic Clients with demographic variables, n=50

Demographic Variables	Groups	Levels			Chi square	df	P- value
		Low Risk	Moderate Risk	High Risk			
Age	31-40 years	5	0	0	9.40	10	0.49^{NS}
	41-50 years	6	4	0			
	51-60 years	8	8	0			
	61-70 years	3	9	0			
	71-80 years	3	3	0			
	81-90 years	0	1	0			
Gender	Male	9	17	0	5.12	2	0.77^{NS}

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	Female	16	8	0			
	Transgender	0	0	0			
Marital Status	Married	16	24	0	8.16	6	0.22^{NS}
	Unmarried	6	1	0			
	Divorced/Separated	0	0	0			
	Widow/Widower	3	0	0			
Education	Under Matriculate	8	10	0	1.84	8	0.98^{NS}
	10^{th} pass	9	5	0			
	12^{th} pass	3	4	0			
	Graduate	4	4	0			
	Post Graduate	1	2	0			
Nature of work	Sedentary	6	9	0	2.14	4	0.71^{NS}
	Moderate Physical activity	14	9	0			
	Active work – Labourers/Farmers	5	7	0			
Occupation	Employed	4	3	0	3.68	12	0.98^{NS}
	Not employed	3	2	0			
	Retired	2	6	0			
	Business	8	6	0			
	Daily wages	1	0	0			
	Self employed	7	8	0			
	Others	0	0	0			
Religion	Hindu	8	9	0	1.06	6	0.98^{NS}
	Muslim	16	16	0			
	Christian	1	0	0			
	Others (Buddhists)	0	0	0			
Type of family	Joint family	16	18	0	0.36	2	0.83^{NS}
	Nuclear family	9	7	0			
Area of living	Urban	13	8	0	2.04	2	0.36^{NS}
	Rural	12	17	0			
Socio-Economic Status per capita (According to Prasad's Scale 2019)	Upper class-(Rs 7008 and above)	2	1	0	3.14	8	0.92^{NS}
	Upper middle class-(Rs 3504 –Rs 7007)	3	6	0			
	Middle class –(Rs-2102- Rs 3503)	16	13	0			
	Lower middle class-(Rs 1051- Rs 2101)	3	5	0			
	Lower – (Below Rs 1050)	1	0	0			
Current treatment	OPD	7	8	0	0.08	2	0.96^{NS}
	IPD	18	17	0			
Smoking	Light Smoker (1 to 5 times per week)	0	0	0	51.02	8	$\mathbf{0.00^{S}}$
	Moderate Smoker (6 to 15 times per week)	0	0	0			
	Heavy Smoker (16 to 25 times per week)	0	1	0			
	Very Heavy Smoker (Above 25 times per week)	0	0	0			
	Non Smoker	25	24	0			
Alcohol	1 to 5 times per month	0	0	0	1.02	8	0.99^{NS}
	6 to 15 times per month	0	0	0			
	16 to 25 times per month	0	0	0			
	Daily	0	1	0			
	Not taken	25	24	0			

NS- Not significant at 0.05 level of significance, S – significant at 0.05 level of significance

The above Table 11. shows that there was a significant association between risk of peripheral neuropathy with selected demographic variables like smoking. Hence, the research hypothesis was partially accepted. Indicating that there was significant association with smoking but no significant association with respect to age, gender, marital status, education, nature of work, occupation, religion, type of family, area of living, socio-economic status per capita (According to Prasad's Scale 2019), current treatment, alcohol.

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Table 12: Chi square test to find out the association between risk of Peripheral Neuropathy of Diabetic Clients with clinical variables, n=50

Clinical Variables	Groups	Levels			Chi square	df	P-value
		Low Risk	Moderate Risk	High Risk			
Duration of Diabetes	2-6 years	23	18	0	3.88	4	0.42^{NS}
	7-11years	2	5	0			
	12-16 years	0	2	0			
Use of injection (insulin) Medication	1-3 years	7	12	0	7.52	6	0.27^{NS}
	4-6 years	3	6	0			
	More than 6 years	1	1	0			
	No	14	6	0			
Use of Oral Hypoglycemic Agents (OHA)	1-4 years	17	11	19	7.88	6	0.24^{NS}
	5-8 years	7	11	0			
	More than 8 years	1	3	0			
	No	0	0	0			
Use of Anti-Hypertensive Medication	1-4 years	5	8	0	5.30	6	0.50^{NS}
	5-8 years	5	8	0			
	More than 8 years	0	2	0			
	No	15	17	0			
Current Blood Sugar Level FBS	Less than 100mg/dl (5.6 mmol/L) is normal	0	0	0	0.36	4	0.98^{NS}
	From 100 to 125 mg/dl (5.6 to 6.9 mmol/L)	1	2	0			
	More than 126 mg/dl (7mmol/L)	24	23	0			
PPBS	< 139 mg/dl	1	4	0	2.18	4	0.70^{NS}
	From 140 mg/dl to 199 mg/dl	13	10	0			
	More than 200 gm/dl	11	11	0			
HBA1C	Below 5.7%	6	3	0	2.38	4	0.66^{NS}
	Between 5.7% and 6.4%	13	10	0			
	HBA1C of 6.5% or higher	6	12	0			
Thyroid	> 4.5 mU/L (High)	4	3	0	15.58	4	**0.00^{S}**
	0.45 - 4.5 mU/L (Normal)	18	19	0			
	< 0.45 mU/L (Low)	3	3	0			
Blood Pressure	≤ 90 mmHg (Systolic) or ≤ 60 mmHg (Diastolic) (Hypotension)	0	0	0	5.56	10	0.85^{NS}
	≤ 100 mmHg (Systolic) or ≤ 65 mmHg (Diastolic) (Low Normal)	3	1	0			
	≤ 120 mmHg (Systolic) or ≤ 80 mmHg (Diastolic) (Normal)	12	8	0			
	≤ 140 mmHg (Systolic) or ≤ 90 mmHg (Diastolic) (High Normal)	5	4	0			
	≤ 160 mmHg (Systolic) or ≤ 100 mmHg (Diastolic) (Hypertension Mild stage –I)	5	10	0			
	>160 mmHg (Systolic) or >110mmHg (Dystolic) (Hypertension Moderate Stage –II) (Requires Treatment)	0	2	0			
BMI	18.5 - 24.9 (Normal weight)	15	15	10	1.06	8	0.99^{NS}
	<18.5 (Underweight)	0	0	0			
	25 – 29.5 (Over weight)	10	9	0			
	30 – 34.9 (Obese)	0	1	0			
	> 35 (Extremely Obese)	0	0	0			
Family history of Diabetes	Father	1	1	0	4.88	12	0.96^{NS}
	Mother	2	1	0			
	Both Father and Mother	2	5	0			
	Grandfather	0	1	0			
	Grandmother	1	0	0			
	Both Grandfather and Grandmother	0	1	0			
	No	19	16	0			
Co-morbidity	Hypertension	2	10	0	7.52	8	0.48^{NS}
	Thyroid disorder	3	3	0			
	Renal disease	1	1	0			
	History of stroke	6	3	0			
	No co-morbidity	13	8	0			

NS- Not significant at 0.05 level of significance, S – significant at 0.05 level of significance

The above Table 12, shows that there was significant association between risk of peripheral neuropathy with selected clinical variables like thyroid. Hence, the research hypothesis was partially accepted indicating that there was significant association with thyroid but no significant association with respect to duration of diabetes, use of

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injection (insulin) medication, use of Oral Hypoglycemic Agents (OHA), use of anti-hypertensive medication, current blood sugar level (FBS, PPBS, HBA1C), blood pressure, BMI, family history of diabetes, co-morbidity.

Table 13: Chi square test to find out the association between risk of Peripheral Neuropathy based on Subjective Data of Diabetic Clients with demographic variables, n=50

Demographic Variables	Groups	Levels			Chi square	df	P-value
		Low Risk	Moderate Risk	High Risk			
Age	31-40 years	0	4	1	8.83	10	0.54^{NS}
	41-50 years	2	5	3			
	51-60 years	3	7	6			
	61-70 years	0	5	7			
	71-80 years	0	4	2			
	81-90 years	0	1	0			
Gender	Male	4	13	9	1.76	2	0.41^{NS}
	Female	1	13	10			
	Transgender	0	0	0			
Marital Status	Married	3	20	17	3.98	6	0.67^{NS}
	Unmarried	1	5	1			
	Divorced/Separated	0	0	0			
	Widow/Widower	1	1	1			
Education	Under Matriculate	0	10	8	15.74	8	$\mathbf{0.04}^{S}$
	10^{th} pass	3	5	6			
	12^{th} pass	1	4	7			
	Graduate	0	5	3			
	Post Graduate	1	2	0			
Nature of work	Sedentary	0	12	3	11.92	4	$\mathbf{0.01}^{S}$
	Moderate Physical activity	4	7	12			
	Active work – Labourers/Farmers	1	7	4			
Occupation	Employed	1	5	1	8.13	10	0.61^{NS}
	Not employed	0	3	2			
	Retired	0	5	3			
	Business	3	4	7			
	Daily wages	0	1	0			
	Self employed	1	8	6			
	Others	0	0	0			
Religion	Hindu	1	11	5	3.24	6	0.77^{NS}
	Muslim	4	14	14			
	Christian	0	1	0			
	Others	0	0	0			
Type of family	Joint family	2	19	13	2.11	2	0.34^{NS}
	Nuclear family	3	7	6			
Area of living	Urban	3	10	8	0.8	2	0.67^{NS}
	Rural	2	16	11			
Socio-Economic Status per capita (According to Prasad's Scale 2019)	Upper class-(Rs 7008 and above)	0	2	1	1.61	8	0.99^{NS}
	Upper middle class-(Rs 3504 –Rs 7007)	1	5	3			
	Middle class –(Rs-2102- Rs 3503)	3	14	12			
	Lower middle class-(Rs 1051- Rs 2101)	1	4	3			
	Lower – (Below Rs 1050)	0	1	0			
Current treatment	OPD	3	10	2	6.45	2	$\mathbf{0.03}^{S}$
	IPD	2	16	17			
Smoking	Light Smoker (1 to 5 times per week)	0	0	0	9.15	8	0.32^{NS}
	Moderate Smoker (6 to 15 times per week)	0	0	0			
	Heavy Smoker (16 to 25 times per week)	1	0	0			
	Very Heavy Smoker (Above 25 times per week)	0	0	0			
	Non Smoker	4	26	19			
Alcohol	1 to 5 times per month	0	0	0	9.17	8	0.32^{NS}
	6 to 15 times per month	0	0	0			
	16 to 25 times per month	0	0	0			
	Daily	1	0	0			
	Not taken	4	26	19			

NS- Not significant at 0.05 level of significance, S-significant at 0.05 level of significance

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The above Table 13. shows that there was a significant association between risk of peripheral neuropathy with selected demographic variables like education, nature of work, current treatment. Hence, the research hypothesis was partially accepted. Indicating that there was significant association with education, nature of work, current treatment but no significant association with respect to age, gender, marital status, occupation, religion, type of family, area of living, socio-economic status per capita (According to Prasad's Scale 2019), smoking, alcohol.

Table 14: Chi square test to find out the association between risk of Peripheral Neuropathy based on Subjective Data of Diabetic Clients with Clinical variables, n=50

Clinical Variables	Groups	Levels			Chi square	df	P- value
		Low Risk	Moderate Risk	High Risk			
Duration of Diabetes	2-6 years	5	22	14	2.13	4	0.71^{NS}
	7-11years	0	3	4			
	12-16 years	0	1	1			
Use of injection (insulin) Medication	1-3 years	2	12	5	6.68	6	0.35^{NS}
	4-6 years	0	4	5			
	More than 6 years	0	0	2			
	No	3	10	7			
Use of Oral Hypoglycemic Agents (OHA)	1-4 years	4	15	9	3.56	6	0.73^{NS}
	5-8 years	1	10	7			
	More than 8 years	0	1	3			
	No	0	0	0			
Use of Anti-Hypertensive Medication	1-4 years	1	6	6	1.25	6	0.97^{NS}
	5-8 years	1	7	5			
	More than 8 years	0	1	1			
	No	3	12	7			
Current Blood Sugar Level FBS	Less than 100mg/dl (5.6 mmol/L) is normal	0	0	0	0.47	4	0.97^{NS}
	From 100 to 125 mg/dl (5.6 to 6.9 mmol/L)	0	2	1			
	More than 126 mg/dl (7mmol/L)	5	24	18			
PPBS	< 139 mg/dl	1	2	2	3.68	4	0.45^{NS}
	From 140 mg/dl to 199 mg/dl	2	15	6			
	More than 200 gm/dl	2	9	11			
HBA1C	Below 5.7%	0	5	4	6.19	4	0.18^{NS}
	Between 5.7% and 6.4%	1	14	8			
	HBA1C of 6.5% or higher	4	7	7			
Thyroid	> 4.5 mU/L (High)	1	4	2	5.36	4	0.25^{NS}
	0.45 - 4.5 mU/L (Normal)	2	19	16			
	< 0.45 mU/L (Low)	2	3	1			
Blood Pressure	≤ 90 mmHg (Systolic) or ≤ 60 mmHg (Diastolic) (Hypotension)	0	0	0	5.41	10	0.86^{NS}
	≤ 100 mmHg (Systolic) or ≤ 65 mmHg (Diastolic) (Low Normal)	0	3	1			
	≤ 120 mmHg (Systolic) or ≤ 80 mmHg (Diastolic) (Normal)	4	9	7			
	≤ 140 mmHg (Systolic) or ≤ 90 mmHg (Diastolic) (High Normal)	1	4	4			
	≤ 160 mmHg (Systolic) or ≤ 100 mmHg (Diastolic) (Hypertension Mild stage –I)	0	9	6			
	>160 mmHg (Systolic) or >110mmHg (Diastolic) (Hypertension Moderate Stage –II) (Requires Treatment)	0	1	1			
BMI	18.5 - 24.9 (Normal weight)	5	15	10	4.77	8	0.78^{NS}
	<18.5 (Underweight)	0	0	0			
	25 – 29.5 (Over weight)	0	10	9			
	30 – 34.9 (Obese)	0	1	0			
	> 35 (Extremely Obese)	0	0	0			
Family history of Diabetes	Father	2	0	0	23.64	12	**0.02^{S}**
	Mother	0	3	0			
	Both Father and Mother	0	4	3			
	Grandfather	0	0	1			
	Grandmother	0	0	1			
	Both Grandfather and Grandmother	0	1	0			
	No	3	18	14			
Co-morbidity	Hypertension	1	5	6	3.88	8	0.86^{NS}
	Thyroid disorder	0	3	2			
	Renal disease	0	2	0			

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	History of stroke	1	6	3			
	No co-morbidity	3	10	8			

NS- Not significance at 0.05 level of significance, S- significant at 0.05 level of significance

The above Table 14. Shows that there was a significant association between risks of peripheral neuropathy with selected clinical variables like family history of diabetes. Hence, the research hypothesis was partially accepted. Indicating that there was significant association with family history of diabetes but no significant association with respect to duration of diabetes, use of injection (insulin) medication, oral hypoglycaemic agents (OHA), use of anti-hypertensive medication, current blood sugar level (FBS, PPBS, HBA1C), thyroid, blood pressure, BMI, co-morbidity.

Table 15: Chi square test to find out the association between risk of Peripheral Neuropathy based on Objective Data of Diabetic Clients with demographic variables, n=50

Demographic Variables	Groups	Levels			Chi square	df	P-value
		Low Risk	Moderate Risk	High Risk			
Age	31-40 years	5	0	0	7.62	10	0.66^{NS}
	41-50 years	9	1	0			
	51-60 years	12	3	0			
	61-70 years	9	4	0			
	71-80 years	5	1	0			
	81-90 years	0	1	0			
Gender	Male	19	7	0	1.61	2	0.44^{NS}
	Female	21	3	0			
	Transgender	0	0	0			
Marital Status	Married	31	9	0	1.04	6	0.98^{NS}
	Unmarried	6	1	0			
	Divorced/Separated	2	0	0			
	Widow/Widower	1	0	0			
Education	Under Matriculate	14	4	0	3.51	8	0.89^{NS}
	10^{th} pass	13	1	0			
	12^{th} pass	6	1	0			
	Graduate	5	3	0			
	Post Graduate	2	1	0			
Nature of work	Sedentary	11	4	0	12.91	4	$\mathbf{0.01}^{S}$
	Moderate Physical activity	23	0	0			
	Active work – Labourers/Farmers	6	6	0			
Occupation	Employed	6	1	0	4.38	12	0.97^{NS}
	Not employed	3	2	0			
	Retired	5	3	0			
	Business	13	1	0			
	Daily wages	0	0	0			
	Self employed	13	3	0			
	Others	0	0	0			
Religion	Hindu	15	2	0	1.47	6	0.96^{NS}
	Muslim	24	8	0			
	Christian	1	0	0			
	Others	0	0	0			
Type of family	Joint family	26	8	0	0.82	2	0.66^{NS}
	Nuclear family	14	2	0			
Area of living	Urban	17	4	0	0.02	2	0.99^{NS}
	Rural	23	6	0			
Socio-Economic status per capita (According to Prasad's Scale 2019)	Upper class-(Rs 7008 and above)	2	1	0	2.41	8	0.96^{NS}
	Upper middle class-(Rs 3504 –Rs 7007)	6	3	0			
	Middle class –(Rs-2102- Rs 3503)	25	4	0			
	Lower middle class-(Rs 1051- Rs 2101)	6	2	0			
	Lower – (Below Rs 1050)	1	0	0			
Current treatment	OPD	13	2	0	0.58	2	0.74^{NS}
	IPD	27	8	0			
Smoking	Light Smoker (1 to 5 times per week)	0	0	0	4.08	8	0.84^{NS}

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	Moderate Smoker (6 to 15 times per week)	0	0	0			
	Heavy Smoker (16 to 25 times per week)	0	1	0			
	Very Heavy Smoker (Above 25 times per week)	0	0	0			
	Non Smoker	40	9	0			
Alcohol	1 to 5 times per month	0	0	0	4.08	8	0.84^{NS}
	6 to 15 times per month	0	0	0			
	16 to 25 times per month	0	0	0			
	Daily	0	1	0			
	Not taken	40	9	0			

NS- Not significant at 0.05 level of significance, S – significant at 0.05 level of significance

The above Table 15. shows that there was a significant association between risk of peripheral neuropathy with selected demographic variables like nature of work Hence, the research hypothesis was partially accepted. Indicating that there was significant association with nature of work but no significant association with respect to age, gender, marital status, education, occupation, religion, type of family, area of living, socio economic status per capita (According to Prasad's scale 2019), current treatment, smoking, alcohol.

Table 16: Chi square test to find out the association between risk of Peripheral Neuropathy based on Objective Data of Diabetic Clients with Clinical variables, n=50

Clinical Variables	Groups	Levels			Chi square	df	P- value
		Low Risk	Moderate Risk	High Risk			
Duration of Diabetes	2-6 years	35	6	0	9.06	4	0.05^{NS}
	7-11years	5	2	0			
	12-16 years	0	2	0			
Use of injection (insulin) Medication	1-3 years	14	5	0	5.40	6	0.49^{NS}
	4-6 years	6	3	0			
	More than 6 years	1	1	0			
	No	19	1	0			
Use of Oral Hypoglycemic Agents (OHA)	1-4 years	26	2	0	7.14	6	0.30^{NS}
	5-8 years	12	6	0			
	More than 8 years	2	2	0			
	No	0	0	0			
Use of Anti-Hypertensive Medication	1-4 years	9	4	0	6.29	6	0.39^{NS}
	5-8 years	9	4	0			
	More than 8 years	1	1	0			
	No	21	1	0			
Current Blood Sugar Level FBS	Less than 100mg/dl (5.6 mmol/L) is normal	0	0	0	0.80	4	0.93^{NS}
	From 100 to 125 mg/dl (5.6 to 6.9 mmol/L)	3	0	0			
	More than 126 mg/dl (7mmol/L)	37	10	0			
PPBS	< 139 mg/dl	2	3	0	12.67	4	$\mathbf{0.01^{S}}$
	From 140 mg/dl to 199 mg/dl	23	0	0			
	More than 200 gm/dl	15	7	0			
HBA1C	Below 5.7%	8	1	0	1.22	4	0.87^{NS}
	Between 5.7% and 6.4%	19	4	0			
	HBA1C of 6.5% or higher	13	5	0			
Thyroid	> 4.5 mU/L (High)	5	2	0	1.31	4	0.85^{NS}
	0.45 - 4.5 mU/L (Normal)	31	6	0			
	< 0.45 mU/L (Low)	4	2	0			
Blood Pressure	≤ 90 mmHg (Systolic) or ≤ 60 mmHg (Diastolic) (Hypotension)	0	0	0	5.20	8	0.73^{NS}
	≤ 100 mmHg (Systolic) or ≤ 65 mmHg (Diastolic) (Low Normal)	4	0	0			
	≤ 120 mmHg (Systolic) or ≤ 80 mmHg (Diastolic) (Normal)	17	3	0			
	≤ 140 mmHg (Systolic) or ≤ 90 mmHg (Diastolic) (High Normal)	8	1	0			
	≤ 160 mmHg (Systolic) or ≤ 100 mmHg (Diastolic) (Hypertension Mild stage –I)	9	6	0			
	>160 mmHg (Systolic) or >110mmHg (Diastolic) (Hypertension Moderate Stage –II) (Requires Treatment)	2	0	0			
BMI	18.5 - 24.9 (Normal weight)	23	7	0	0.67	8	0.99^{NS}
	<18.5 (Underweight)	0	0	0			
	25 – 29.5 (Over weight)	16	3	0			
	30 – 34.9 (Obese)	1	0	0			
	> 35 (Extremely Obese)	0	0	0			

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Family history of Diabetes	Father	1	1	0	7.71	12	0.80^{NS}
	Mother	2	1	0			
	Both Father and Mother	7	0	0			
	Grandfather	1	0	0			
	Grandmother	1	0	0			
	Both Grandfather and Grandmother	0	1	0			
	No	28	7	0			
Co-morbidity	Hypertension	5	7	0	17.33	8	**0.02**^{S}
	Thyroid disorder	5	0	0			
	Renal disease	1	1	0			
	History of stroke	10	0	0			
	No co-morbidity	19	2	0			

NS – Not significant at 0.05 level of significance, S –significant at 0.05 level of significance

The above Table 16. shows that there was a significant association between risk of peripheral neuropathy with selected clinical variables like PPBS, co-morbidity Hence, the research hypothesis was partially accepted. Indicating that there was significant association with co-morbidity but no significant association with respect to duration of diabetes, use of injection (insulin) medication, oral hypoglycemic agents (OHA), use of Anti-hypertensive medication, current blood sugar level (FBS, HBA1C), thyroid, blood pressure, BMI, family history of diabetes.

5. Discussion

The title of the study was to assess the risk of peripheral neuropathy among diabetic clients with a view to develop and informational booklet in selected hospitals in Guwahati, Assam."

Major findings of the study were as follows

Demographic variables of the Participants

- Less than half **16 (32%)** of diabetic clients belonged to age group 51-60 years.
- More than half **26(52%)** of diabetic clients were male.
- Most **40 (80%)** of diabetic clients were married.
- Less than half **18(36%)** of diabetic clients were under matriculation.
- Near half **23(46%)** of diabetic clients had moderate physical activity.
- Less than half **15 (30%)** of diabetic clients were self employed.
- Majority **32(64%)** of diabetic clients were from Muslim community.
- Majority **34 (68%)** of diabetic clients were from joint family.
- Majority **29(58%)** of diabetic clients were from rural areas
- Majority **29(58%)** of diabetic clients were from middle class.
- Majority **35(70%)** were from In-patient department (IPD).
- Most **49(98%)** of diabetic patient were non smoker.
- Most **49 (98%)** of diabetic patient did not have a habit of alcohol consumption.
- All of **50 (100%)** received an advice on self care.

Clinical Variables of the participants

- In the present study, most **41 (82%)** of the diabetic clients are having Diabetes since 2-6 years.
- In the present study, near half **20 (40%)** of the diabetic clients do not use injection (insulin) medication.
- In the present study, majority **28 (56%)** of the diabetic clients use Oral Hypoglycemic Agents (OHA) for 1-4 years.
- In the present study, near half **22 (44%)** of the diabetic clients do not use Anti-Hypertensive medication.
- Current blood sugar level:
  a) In the present study, most 47 (94%) of the diabetic clients are having FBS level more than 126 mg/dl.
  b) In the present study, near half 23 (46%) of the diabetic clients are having PPBS level from 140 – 199 mg/dl.
  c) In the present study, near half 23 (46%) of the diabetic clients are having HBA1C level between 5.7 and 6.4%.
- In the present study, most **37 (74%)** of the diabetic clients are having normal thyroid level
- In the present study, near half **20 (40%)** the diabetic clients are having normal blood pressure.
- In the present study, majority **30 (60%)** of the diabetic clients are having normal BodyMass Index (BMI).
- In the present study, all **50 (100%)** of the diabetic clients do not present diabetic wound.
- In the present study, most**35 (70%)** of the diabetic clients do not have family history of diabetes.
- In the present study, near half **21(42%)** of the diabetic clients has no co-morbidities.

Risk Assessment of Diabetic Neuropathy of Diabetic Clients

- In the present study, numbness of upper limb (left side) is absent in majority 27 (54%) of the diabetic clients.
- In the present study, numbness of upper limb (right side) is absent in majority 30 (60%) of the diabetic clients.
- In the present study numbness of lower limb (left side) is present in majority 26 (52%) of the diabetic clients.
- In the present study, numbness of lower limb (ride side) is present in half 25 (50%) of the diabetic clients and numbness of lower limb (right side) is absent in half 25 (50%) of the diabetic clients.
- In the present study, pain of upper limb (left side) is present in most 35(70%) of the diabetic clients.
- In the present study, pain in upper limb (right side) is present in majority 33 (66%) of the diabetic clients.
- In the present study, pain in lower limb (left side) is present in most 40 (80%) of the diabetic clients.
- In the present study, pain in lower limb (right side) is present in most 40 (80%) of the diabetic clients.

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- In the present study, burning sensation of upper limb (palm) is absent in most 35 (70%) of the diabetic clients.
- In the present study, burning sensation of upper limb (fingers) is absent in most 34 (68%) of the diabetic clients.
- In the present study, burning sensation of lower limb (sole) is present in majority 27 (54%) of the diabetic clients.
- In the present study, burning sensation of lower limb (toes) is present in half 25 (50%) of the diabetic clients and burning sensation of lower limb (toes) is absent in half 25 (50%) of the diabetic clients.
- In the present study, tingling sensation of upper limb (left side) is absent in majority 28 (56%) of the diabetic clients.
- In the present study, tingling sensation of upper limb (right side) is absent in majority 28 (56%) of the diabetic clients.
- In the present study, tingling sensation of lower limb (left side) is present in most 37 (74%) of the diabetic clients.
- In the present study, tingling sensation of lower limb (right side) is present in most 37 (74%) of the diabetic clients.
- In the present study, regarding dietary habits, all 50 (100%) of diabetic clients maintained dietary habits.
- In the present study, about physical activity, majority 29 (58%) of diabetic clients maintain morning exercise.
- In the present study, about physical activity, half 25 (50%) of diabetic clients maintain evening exercise and half 25 (50%) of diabetic clients do not maintain evening exercise.
- In the present study, loss of sensation upper limb left side (light touch, temperature, pain,vibratory sensation) is absent in majority 28 (56%) of diabetic clients.
- In the present study, loss of sensation upper limb right side (light touch, temperature, pain, vibratory sensation) is absent in most 38 (76%) of diabetic clients.

6. Discussion of the findings on the basis of objectives of the research study:

Risk of Peripheral Neuropathy among Diabetic Clients

The present study was done to assess the risk of peripheral neuropathy among diabetic clients. The assessment on the risk of Peripheral Neuropathy among diabetic clients shows that half **25(50%)** has low risk, half **25(50%)** has moderate risk and 0(0%) has high risk and assessment on the risk of peripheral neuropathy among diabetic clients based on subjective data shows that majority **26(52%)** has moderate risk, less than half 19 (38%) had high risk, less than half 5 (10%) had low risk and assessment on the Risk of peripheral Neuropathy among diabetic clients based on objective data shows that most **40(80%)** has low risk, less than half 10(20%) has moderate risk and 0(0%) has high risk.

The finding is supported by study finding of Nongmaithem M, Bawa APS, Pithwa AK, Bhatia SK, Singh G, Gooptu S. (2016) on the risk factors and foot care behavior among diabetics where the study showed that there is significant risk factors in peripheral neuropathy, peripheral vascular disease, gender, loss of sensation, duration of diabetes and smoking. The study concluded that Diabetic foot ulcers were more common in elderly males. Smoking, trauma, duration of diabetes mellitus, high levels of glycated haemoglobin, Peripheral neuropathy, peripheral vascular disease had significant association with occurrence of foot ulcers. MNSI scores show high predictive value for development of foot ulcers among diabetics. Awareness of foot hygiene was poor which need to promote practice of foot care among diabetic population.[14]

Association between risk of peripheral neuropathy with selected demographic variables and other clinical variables

The present study was done to determine the association between the risk of peripheral neuropathy with selected demographic variables and other clinical variables.

The present study revealed that there was a significant association between risk of peripheral neuropathy with selected demographic variables like smoking. Hence, the research hypothesis was partially accepted. Indicating that there was significant association with smoking but no significant association with respect to age, gender, marital status, education, nature of work, occupation, religion, type of family, area of living, socio-economic status per capita (According to Prasad's Scale 2019), current treatment, alcohol, advice received on self care.

The present study revealed that there was significant association between risk of peripheral neuropathy with selected clinical variables like thyroid. Hence, the research hypothesis was partially accepted indicating that there was significant association with thyroid but no significant association with respect to duration of diabetes, use of injection (insulin) medication, use of Oral Hypoglycemic Agents (OHA), use of anti-hypertensive medication, current blood sugar level (FBS, PPBS, HBA1C),blood pressure, BMI, presence of diabetic wound, family history of diabetes, co-morbidity.

The present study revealed that there was a significant association between risk of peripheral neuropathy with selected demographic variables like education, nature of work, current treatment. Hence, the research hypothesis was partially accepted. Indicating that there was significant association with education, nature of work, current treatment but no significant association with respect to age, gender, marital status, occupation, religion, type of family, area of living, socio-economic status per capita (According to Prasad's Scale 2019), smoking, alcohol, advice received on self care.

The present study revealed that there was a significant association between risk of peripheral neuropathy with selected clinical variables like family history of diabetes. Hence, the research hypothesis was partially accepted. Indicating that there was significant association with family history of diabetes but no significant association with respect to duration of diabetes, use of injection (insulin) medication, oral hypoglycaemic agents (OHA), use of anti-hypertensive medication, current blood sugar level (FBS, PPBS, HBA1C),

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thyroid, blood pressure, BMI, presence of diabetic wound, co-morbidity.

The present study revealed that there was a significant association between risk of peripheral neuropathy with selected demographic variables like nature of work Hence, the research hypothesis was partially accepted. Indicating that there was significant association with nature of work but no significant association with respect to age, gender, marital status, education, occupation, religion, type of family, area of living, socio economic status per capita (According to Prasad's scale 2019), current treatment, smoking, alcohol, advice received on self-care.

The present study revealed that there was a significant association between risk of peripheral neuropathy with selected clinical variables like PPBS, co-morbidity. Hence, the research hypothesis was partially accepted. Indicating that there was significant association with co-morbidity but no significant association with respect to duration of diabetes, use of injection (insulin) medication, oral hypoglycemic agents (OHA), use of Anti-hypertensive medication, current blood sugar level (FBS, HBA1C), thyroid, blood pressure, BMI, presence of diabetic wound, family history of diabetes.

The present study is supported by cross-sectional study conducted by Chaisakul J, Ukritchon S, Rangsin R, Mungthin M. (2020) where the study showed that Data from 65,904 T2DM patients was evaluated, 1,808 (2.7%) of whom had Diabetic Peripheral Neuropathy (DPN) On multivariable analysis adjusted for patient characteristics and relevant complications, the risk of neuropathy was significantly greater in insulin users, as well as in calcium channel blocker users. Moreover, regression analysis showed that age, smoking habit, renal insufficiency, dyslipidemia, diabetic retinopathy, and peripheral arterial diseases were associated with Diabetic Peripheral Neuropathy (DPN) The study concluded that Peripheral neuropathy can occur in T2DM patients showing micro vascular symptoms and in those who receive certain hypoglycemic and antihypertensive agents. Early evaluation and effective treatments are essential to prevent progressive neuropathy.[15]

7. Nursing Implications

The investigator had drawn the following implications from the study which is of vital concern in the field of nursing practice, nursing education, nursing administration and nursing research.

Nursing Practice: Nurse could practice and assess the risk of peripheral neuropathy among diabetic clients through Diabetic Neuropathy Risk Assessment Checklist, it will help to be aware of and help to prevent Peripheral Neuropathy among Diabetic Clients.

Nursing Education: The curriculum for nurses needs to give more emphasis in patient education about the risk of Peripheral Neuropathy among diabetic clients in order to prevent further complications and to have a quality of life.

Nursing Administration: The nurse administrator can make policies, protocols and health education programs for nurses to learn and practice the assessment of risk of peripheral neuropathy among diabetic clients to have a better health.

Nursing Research: The nurse researcher provides a knowledge to the diabetic clients, It helps to enhance aware of the risk status of Peripheral Neuropathy among diabetic clients. The nurse researcher are expected to provide research based nursing care it will help to strengthen the nursing research pertaining to medical surgical nursing.

8. Limitations

The present study is limited to Diabetic Clients who are medically diagnosed with Type-I or Type-II Diabetes Mellitus for ≥2 years.

9. Recommendation

The study can be replicated in different settings.
The same study can be done on large number of samples.
The study can be done in community settings.

The study can be undertaken to assess the risk factors of Peripheral Neuropathy and controlling them at an early stage and preventing serious Diabetic Peripheral Neuropathy related consequences.

10. Conclusion

From the findings of the present study, it can be concluded that Diabetic Clients has low risk, moderate risk, high risk and assessment of the risk status of Peripheral Neuropathy at the earliest will help the Diabetic Clients from further consequences and it is of utmost importance to understand that evaluating Peripheral Neuropathy as a routine practice in a simple way may also play a vital role in preventing foot ulcers in adults.

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