

## TO STUDY THE PREVALENCE OF NEUROPATHY COMPLICATION IN NEWLY DIAGNOSED TYPE 2 DIABETES MELLITUS

Dr Kaushal Kumar Sinha<sup>1</sup>, Dr Abhishek Bhadani<sup>2</sup>, Dr Anand Dev<sup>3</sup>, Dr Abhay Kumar<sup>4</sup>, Dr Nistha Kishore<sup>5</sup>

<sup>1</sup>Fellow Noninvasive Cardiology, GIPMER

<sup>2</sup>Assistant Professor, Dr. Baba Saheb Ambedkar Medical College and Hospital

<sup>3</sup>Associate Professor, NSMCH

<sup>4</sup>Senior Resident, IGIMS

<sup>5</sup>St Stephens Hospital

**Article Info:** Received 10 February 2020; Accepted 11 May 2020

**DOI:** <https://doi.org/10.32553/ijmbs.v4i7.1292>

**Corresponding author:** Dr Kaushal Kumar Sinha

**Conflict of interest:** No conflict of interest.

### Abstract

**Background:** Diabetes is one of the commonest chronic non communicable disease affecting the society at large both in developing and developed countries. In our country, as diabetes is diagnosed late, many patients comes with complication of diabetes. Present study aimed to study the prevalence of neuropathy complications in newly diagnosed type 2 diabetes mellitus.

**Subjects and Methods:** In this study, 100 newly diagnosed cases of type 2 diabetes mellitus patients were evaluated. A cross section of both male and female diabetes patients diagnosed within the last 3 months (new onset) was taken into study. A detailed history, clinical examination and relevant investigations were performed. Collected data were analysed by using appropriate software.

**Results:** In our study 60% were male and 40% were female. Highest neuropathy complication was seen in 56-65 age group. It was present in 35% of female and 16.66% of male in our study.

**Conclusion:** Endeavour should be made to control hyperglycemia and dyslipidemia tightly by appropriate therapeutic measures so that the occurrence and worsening of complications could be mitigated.

**Aims and Objectives:** To study the Prevalence of neuropathy complication in newly diagnosed type 2 diabetes mellitus

### Introduction

**Diabetes Mellitus (D.M.)** refers to a group of common metabolic disorders that share the phenotype of hyperglycemia<sup>1</sup>. It results from a defect in insulin secretion and/or insulin action, which results in hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism<sup>2</sup>.

Diabetes is one of the commonest chronic non communicable diseases affecting the society at large both in developing and developed countries. It is generally classified as type 1, type 2 or other specific types<sup>3</sup>.

Type 1 diabetes is generally considered a T cell mediated autoimmune disease involving destruction of the insulin secreting  $\beta$  cells in the pancreas, resulting in absolute insulin deficiency, whereas type 2 diabetes is characterised by resistance to the action of insulin and an inability to produce sufficient insulin to overcome this 'insulin resistance'<sup>4</sup>.

Globally, all types of diabetes are on the increase, type 2 diabetes in particular<sup>5</sup>. While diabetes has been known for many centuries, the prevalence has reached epidemic level proportion only recently<sup>6</sup>. The rise of prevalence has been more alarming in developing countries than in developed

countries. There has also been a trend towards a shift in the mean age of onset of type 2 diabetes to a much younger age<sup>7</sup>.

As per the 9<sup>th</sup> edition of International Diabetes Federation Atlas, 2019, The global diabetes prevalence is estimated to be 9.3% (463 million people), rising to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045... The major proportion of this increase will occur in developing countries of the world like India<sup>8</sup>. One in two (50.1%) people living with diabetes do not know that they have diabetes.

India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the "**Diabetes Capital of the World**".

Type 2 diabetes is accompanied by a high prevalence of associated disorders like the various components of the metabolic syndrome like hypertension, dyslipidemia and obesity; micro vascular complications like retinopathy (Rt), nephropathy (Np), neuropathy (Nu) and macro vascular complications like coronary artery disease, peripheral vascular disease and cerebrovascular disease resulting in significantly high morbidity and mortality<sup>[9-14]</sup>. The chronic complications of diabetes mellitus translate into a

significant economic burden on individuals and community at large<sup>14</sup>.

Due to its asymptomatic course, type 2 diabetes evades diagnosis for many years. Harris et al.<sup>15</sup> estimated a gap of 9 to 12 years between the onset of type 2 diabetes and its clinical diagnosis. Long standing diabetes mellitus is associated with an increased prevalence of microvascular and macrovascular complications. The first indication of the presence of type 2 diabetes mellitus may actually be detected at the time of diagnosis of a diabetic complication.

### Materials and Methods

In this study, 100 newly diagnosed cases of type 2 diabetes mellitus patients were evaluated. A cross section of both male and female diabetes patients diagnosed within the last 3 months (new onset) attending the general medicine indoor and outpatient department and other clinical departments of Katihar Medical College, Katihar was taken into study.

A detailed history, clinical examination and relevant investigations were performed

### History

Age, sex and duration of diabetes were recorded. Family history of diabetes and personal medical history was enquired. History of symptoms suggestive of neuropathy complications like abnormal sensory and motor complaints, bowel and bladder abnormalities was taken.

### Inclusion Criteria

Patients with:

- Newly diagnosed case of type 2 diabetes mellitus
- Cases within 3 months of diagnosis

### Exclusion Criteria

Patients with:

- Type 1 diabetes mellitus
- Diagnosed type 2 diabetes of more than 3 months duration
- Previous history of any vascular disease
- End stage renal disease
- Pre existing neurological disease including stroke, dementia
- History of nephrotoxic, neurotoxic or oculotoxic drug use

### Clinical Examination

A detailed clinical examination was performed as follows.

Detailed neurological examination was done. Neuropathy was diagnosed by history of numbness, paraesthesias, tingling sensation, and burning sensation and was

confirmed<sup>16</sup> by loss of touch sensation, loss of pin prick test, vibration sense testing with 128 Hz tuning fork and loss of ankle reflex. A 10gm monofilament test was done to identify foot prone to ulcer.

To rule out autonomic neuropathy the following were done.

1. History of change in bowel or bladder habits
2. Examination of skin to note change in colour, temperature, sweating
3. Changes in heart rate and blood pressure
  - a) Resting pulse rate and normal variation with respiration
  - b) Response of heart rate to carotid massage
  - c) The patient was rested on the examination couch for 15 minutes; a sphygmomanometer cuff was tied around the arm. Supine BP was recorded and patient was asked to stand. After 3 minutes, BP was recorded again. A fall in systolic pressure of more than 20 mm of Hg on standing indicates autonomic neuropathy.
  - d) Deep breaths test: the pulse rate of the patient was noted while lying flat. Then the pulse rates during 6 maximal breaths was recorded. More than 15 beats fall per minute is normal. In autonomic neuropathy the fall is less than 10.
  - e) Valsalva test: the patient was asked to blow in a sphygmomanometer cuff to maintain a pressure of 40 mm hg for 15 seconds. The ratio of highest pulse rate to lowest pulse rate was measured. Normally it is more than 1.5; in case of autonomic neuropathy it is less than 1.1.

### Biochemical Analysis

Biochemical analysis of the following were done in the department of Biochemistry

### American Diabetes Association Guidelines 2019 (ADA 2019)

- Fasting and/or 2 hr post 75 oral anhydrous glucose plasma glucose level was estimated by enzymatic glucose oxidation method. A basal FPG >126 mg/dl, and a plasma glucose >200 mg/dl at 2hr post 75 glucose confirmed on a second occasion was diagnostic of diabetes.
- Glycosylated haemoglobin (HbA1c) was estimated by ion exchange chromatography. In diabetes mellitus the value is  $\geq 6.5$ . It gives an idea of the plasma glucose control on the preceding 3 months.

Data was tabulated into a master chart and mean value and standard deviation was calculated for each variable, p value was calculated using T-TEST and FISCHER EXACT TEST with the help of standard statistical software. Pearson correlation coefficient was seen to see correlation between variables.

## Result and Analysis

**Table 1:** Sex Wise Distribution of Population

SEX	NUMBER	%AGE
MALE	60	60
FEMALE	40	40

In our study 60% were male and 40% were female

**Table 2:** Distribution of Population in Different Age Group

AGE GROUPS (in yrs)	NUMBER	% AGE
36-45	14	14
46-55	51	51
56-65	35	35

Majority of cases were in the age group of 46-55 years, followed by in age group 56-65 years.

**Table 3:** Showing Male and Female Distribution in Different Age Groups

AGE GROUPS (in yrs)	MALE	FEMALE
36-45	7	7
46-55	31	20
56-65	22	13

Maximum number of male and female was found in age group of 46-55 years.

**Table 4:** Prevalence of Neuropathy in Different Age Group

AGE GROUP(in yrs)	NEUROPATHY		PERCENT NEUROPATHY
	YES	NO	
36-45 (N=14)	0	14	0
46-55 (N=51)	10	41	19.6
56-65 (N=35)	14	21	40

Highest neuropathy was seen in 56-65 age group.

**Table 5:** Prevalence of Neuropathy in Male and Female

SEX	NEUROPATHY		PERCENT NEUROPATHY
	YES	NO	
MALE (N=60)	10	50	16.66
FEMALE (N=40)	14	26	35

Neuropathy was present in 35% of female and 16.66% of male.

## Discussion

The present cross sectional study was carried out on 100 consecutive patients of type 2 diabetes who were diagnosed recently (duration less than 3 months). The mean age at diagnosis was found to be 53.7 years. This signifies that in our hospital, diabetic patients are

presenting late. Among the newly diagnosed patients 60 were male and 40 patients were female.

Age wise analysis of the patients reveals that most of the patient were in age group 46-55 yrs n =51 (51%) , followed by in age group 56 – 65 n =35 (35%) and least number in 35 – 45 n= 14 (14%) .This corroborates with the work done by RAMACHANDRA *et al*<sup>17</sup> which shows that in developing countries, the majority of diabetes patients are in the age range of 45-64 years whereas in the developed countries are aged >65 years .In our study 86 % of population was in age group 46 – 65yrs.

Neuropathy is seen in 24 % of patients which is quite similar to study done by Ramachandran *et al.* in Southern India which found a prevalence to 27.5 %<sup>18</sup>, Agrawal *et al.* – 26.8 %<sup>19</sup>. The prevalence of neuropathy in our study was less than the other studies done by DUTTA *et al*<sup>20</sup> and HAMMAN *et al.*<sup>21</sup> The result can be explained by the fact they used electrophysiological studies for the diagnosis of neuropathy which can were more accurate in diagnosing neuropathy and can even diagnose subclinical diabetic neuropathy. Much lower prevalence i.e. 14% was found by Knuiman *et al* (West Australia) which might be due to real ethnic variation and different genetic susceptibility to develop neuropathy in presence of hyperglycaemia<sup>22</sup>

Out of 24 patients 14 (35 %) were female and 10 (16.66%) were male ,so in our study neuropathy was more in female as compared to male but it was statistically insignificant. The finding agrees with the study by DUTTA *et al.*<sup>20</sup> in their study also they found female preponderance of neuropathy.

Age wise analysis shows that no neuropathy was present in 35-45yrs age group,19.60 % neuropathy in 46–55yrs age group ,40% neuropathy in 56 -65 age group..

## Summary and Conclusion

The study was carried out with the intent to assess the prevalence of diabetic Neuropathy complication in the newly diagnosed type 2 diabetics.

As clear from the preceding discussion, following conclusions can be drawn

Diabetic complications are fairly common in newly diagnosed type 2 DM patients. The complications were more common in higher age group.The prevalence of micro vascular complication was found to be 24% for neuropathy.

In summary, prevalence of complications is quite high even at the time of diagnosis of Type 2 diabetes. This is probably because of the insidious onset of diabetes and long duration of asymptomatic disease before symptoms develop. Hence screening tests for complications are strongly recommended at the time of diagnosis not only

for early detection, but also to prevent the progression into end stage disease.

Endeavour should be made to control hyperglycemia and hypertension tightly by appropriate therapeutic measures so that the occurrence and worsening of complications could be mitigated.

There is an urgent need for concerted efforts by Government and Non-governmental sectors to implement national programmes aimed at prevention, management and surveillance of the disease.

### References

1. Harrison's principles of Internal Medicine, 20<sup>th</sup> edition 2018. P- 2850.
2. Hovens MMC, Van de loar FA et al. Acetylsalicylic acid (aspirin) for primary prevention of cardiovascular disease in type 2 diabetes (protocol) Cochrane database of systematic reviews 2005, issue 3. Art no. CD005446.
3. Mohan V, Pradeepa R & Anjana R M, Diabetes in India- An Epidemiological review. Current Controversies and Consensus in Diabetes Management, 1<sup>st</sup> edition 2015. P- 1.
4. Davidson's principles & practice of Medicine, 23<sup>rd</sup> edition, 2018. P - 728.
5. International Diabetes Federation – IDF Diabetes Atlas, 6<sup>th</sup> edn. Brussels, Belgium: International Diabetes Federation, 2013.
6. Major RM. A history of medicine. Blackwell, oxford, 1954; P- 67
7. Progress in Medicine Vol. XXIX 2015. P-164.
8. International Diabetes Federation. The Diabetes Atlas, 9<sup>th</sup> ed. 2019.
9. MJ Garcia, PM McNamara, T Gordon, WB Kannel. Diabetes, 1974, 23, 105-111
10. WB Kannel, DL McGee. Circulation, 1979, 59, 8-13.
11. J Stamler, D Wentworth, J Neaton, JA Schoenberger, D Feigal; for the MRFIT Research Group. Circulation, 1984, 70, 11-161.
12. SM Haffner; S Lehto; T Ronemaa; K Pyorala; M Laasko. N Engl J Med, 1998, 339, 229–234.
13. A Juutilainen; S Lehto; T Ronnemaa; K Pyorala; M Laakso. Diabetes Care, 2008, 31, 714-719.
14. O Wirta; A Pasternak; J Mustonen; P Laippala; Y Lahde. Clin Nephrol, 1999, 51, 329-334.
15. Harris MI, Klein R, Welborn TA, Knudman MW. Onset of NIDDM occurs at least 4-7 yr before clinical diagnosis. Diabetes Care 1992; 13:815 - 819.
16. Hutchinson's clinical methods 23<sup>rd</sup> ed. 2012. P 367.
17. Ramachandran A. Socioeconomic burden of diabetes in India. Suppl. JAPI 2007; 55:9.
18. Ramachandran A, Snehalatha C, Satyavani K, et al., Prevalence of vascular complications and their risk factors in type 2 diabetes. *Journal of Assoc Physicians India* 1999;47:1152-6.
19. RP Agrawal, Vipin Ola, Prashant Bishnoi, et al., Prevalence of micro and macrovascular complications and their risk factors in type 2 diabetes mellitus, JAPI, vol. 62, June 2014.
20. Arindam Dutta, Santa Naorem, Th. Premchand Singh, Kunjabashi Wangjam. Prevalence of peripheral neuropathy in newly diagnosed type 2 diabetics int. j. diab. dev. countries (2005), vol. 25-30-32.
21. Hamman RF, Franklin GA, Mayer EJ, Marshall SM, Marshall JA, Baxter J, Kahn LB. Microvascular complications of NIDDM in Hispanics and Non-Hispanic whites: San Luis Valley Diabetes Study. Diabetes Care San Luis Valley Diabetes Study. Diabetes Care 1991; 14: 655-64.
22. Knudman MW, Welborn TA, McCann VJ, et al., Prevalence of diabetic complications in relation to risk factors. *Diabetes* 1986;35:1332-39.