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Original Research Article

Correlation of Blood Sugar Level with Clinical Manifestation of Peripheral Neuropathy in Type 2 Diabetes Mellitus

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Abstract

During 5th & 6th century BC, sweet taste of urine in polyuric patient was described in Sanskrit (Indian) literature by Susruta, charaka, Vagbhata and the disease was named "Madhumeha". They described that the urine of these patients tasted like honey (madhu), sticky to touch and Ants were strongly attracted to it. To correlate the blood sugar level with clinical manifestation of diabetic peripheral neuropathy in type 2 diabetes mellitus. The study includes all type 2 diabetic patients who attended the department of medicine, ADICHUNCHANAGIRI INSTITUTE OF MEDICAL SCIENCES. This study period was from JANUARY 2016 to DECEMBER 2016 with 100 sample size. Majority of patients were in the age group > 70years. Out of 100 patients studied, 50 patients were male and 50 patients were females. Peripheral neuropathy was more commonly seen in male (42 cases) compared to female (37 cases). Increased duration of diabetes had significant relation to Neuropathy. Out of the 100 diabetic neuropathy patients 18 patients had good control (18%) and 28 patients had fair control (28%) and 54 patient had poor control of blood sugars (54%). Symptoms pertaining to the involvement of the nervous system due to diabetes mellitus were further analyzed in all 100 cases. Sensory involvements were seen in 72 cases and motor involvement in 31 cases. Diabetic neuropathy is common complication of Diabetes mellitus. It is generally considered to be related to duration and severity of hyperglycemia, usually more than 50% of patients with the duration of diabetes of 25yrs or more are affected, making it as the most common disease of Nervous system. It is well known that Diabetes mellitus is rising in an epidemic proportion in Indian subcontinent, prevalence of Diabetic Neuropathy in type -2DM of this country was reported to be 17 to 19% and that of Automatic Neuropathy of 35% of peripheral neuropathy cases.

Keywords: Blood Sugar, Peripheral Neuropathy, Type 2 Diabetes Mellitus.

INTRODUCTION

During 5th & 6th century BC, sweet taste of urine in polyuric patient was described in Sanskrit (Indian) literature by Susruta, charaka, Vagbhata and the disease was named "Madhumeha". They described that the urine of these patients tasted like honey (madhu), sticky to touch and Ants were strongly attracted to it. They differentiated two forms of the disease. One affecting thin people who do not survive long and the other affecting older and obese. They also described relation of Diabetes mellitus to hereditary obesity, sedentary life and diet [1]. This description was parallel to the subdivision of Diabetes mellitus in to the type1and 2 Diabetes mellitus. Indian literature gets credit for the term — Honey urine ‖ referring to the clear colorless nature of Diabetic Urine.

Diabetes Neuropathy is one of the commonest causes of Peripheral Neuropathy. It accounts for hospitalization more frequently than the other complications of the Diabetes mellitus and is the most frequent cause of non traumatic amputation. Diabetes autonomic neuropathy accounts for silent myocardial infarction and shortens the life span resulting in death in 25-50% of patients within 5-10yrs of Autonomic diabetic Neuropathy [2]. The diagnosis of subclinical Diabetic neuropathy requires Electro diagnostic testing and quantitative sensory and autonomic testing.

The primary pathological role of Hyperglycemia in diabetic complications is well established, With the increasing knowledge that maintenance of euglycemia greatly reduces, if not prevents the risk of diabetic complications and at times helps even in regression of such complications, monitoring the control of diabetes is essential for the successful management of the diabetes. The responsibility of the patient and his physician in close monitoring control of diabetes and Tailoring the various components in their management have assumed greater significance [2].

OBJECTIVE

To correlate the blood sugar level with clinical manifestation of diabetic peripheral neuropathy in type 2 diabetes mellitus.

METHODOLOGY

The study includes all type 2 diabetic patients who attended the department of medicine, ADICHUNCHANAGIRI INSTITUTE OF MEDICAL SCIENCES. This study period was from JANUARY 2016 to DECEMBER 2016 with 100 sample size.

Inclusion Criteria

- Patients who full fill ADA criteria for diagnosis of diabetes
- Diabetics of more than 5 years were selected for further evaluation of neuropathic symptoms / signs

Exclusions Criteria

- Nutrition deficiency
- Alcoholism
- Leukemia.

RESULTS

Table-1: Age and Sex wise distribution of cases

Age group (years)	Male		Female		Total	
	No.	%	No.	%	No.	%
41-50	07	07	06	06	13	13
51-60	09	09	08	08	17	17
61-70	14	14	15	15	19	19
>70	20	20	21	21	41	41
Total	50	50	50	50	100	100

Majority of patients were in the age group > 70years. Out of 100 patients studied, 50 patients were male and 50 patients were females.

Table-2: Sex Wise Distribution Peripheral Neuropathy

Sex	**Male**	**Female**
Number of cases	50	50
Peripheral neuropathy	42	37

Peripheral neuropathy was more commonly seen in male (42 cases) compared to female (37 cases).

Table-3: Distribution of cases based on duration of diabetes

Duration of DM	**No. of cases**	**Percentage**
5-10 yrs	60	60
11-20 yrs	32	32
21-30 yrs	8	8

Increased duration of diabetes had significant relation to Neuropathy.

Table-4: Distribution of cases based on Blood sugar levels

Blood sugar levels	**No. of cases**	**Percentage**
Good control	**18**	**18**
Fair control	**28**	**28**
Poor control	**54**	**54**

Out of the 100 diabetic neuropathy patients 18 patients had good control (18%) and 28 patients had fair control (28%) and 54 patient had poor control of blood sugars (54%).

Table-5: Symptoms of Neuropathy

Symptoms	**No. of cases**	**Percentage**
Sensory symptoms	72	72
Motor symptoms	31	31
Cranial nerve symptoms	04	04
Autonomic symptoms	18	18

Symptoms pertaining to the involvement of the nervous system due to diabetes mellitus were further analyzed in all 100 cases. Sensory involvements were seen in 72 cases and motor involvement in 31 cases.

DISCUSSION

Majority of patients were in the age group > 70years. Out of 100 patients studied, 50 patients were male and 50 patients were females. Peripheral neuropathy was more commonly seen in male (42 cases) compared to female (37 cases). Increased duration of diabetes had significant relation to Neuropathy. Out of the 100 diabetic neuropathy patients 18 patients had good control (18%) and 28 patients had fair control (28%) and 54 patient had poor control of blood sugars (54%). Symptoms pertaining to the involvement of the nervous system due to diabetes mellitus were further analyzed in all 100 cases. Sensory involvements were seen in 72 cases and motor involvement in 31 cases.

Study done by Kjerosti Morkid *et al*., [3] out of 294 diabetic patients they found Prevalence of Diabetic Neuropathy in 19.7%, and it increases with age 11.1% in 23-40 years Age group, 32.3% in 60-80 years age group, prevalence is more in female (52.7%) 155 than males (47.3%), mean duration of diabetes to develop neuropathy is 9-11 years, mean HbA1c of 8.75+/-2.20, hypertension was not significantly related to neuropathy, mean BMI in neuropathy patients is 24.43 $\pm$ 3.35.kg/met^2, mean cholesterol level were 190±31. They found prevalence of Diabetic neuropathy is 13.7% in oral hypoglycemic agents (OHA) treated group and 29.2 % in Insulin treated group found more in Insulin treated group.

Study done by Mitrabasu *et al*., [4] found that out of 82 diabetic patients studied 42 patient had peripheral neuropathy and 8 patients had autonomic dysfunction that shows 54.0% and autonomic Involvement in 10.8%, average age of development of peripheral neuropathy in these patients is 50.17$\pm$ 6.9 years. They also observed that age and duration of diabetes play an important role in diabetic neuropathy and significantly associated with higher age, male patients are predominant is developing diabetic neuropathy 75.8% than females 24.2 %, average years need to developing Diabetic Neuropathy is 6.73±7.21, fasting and post prandial Glucose levels and were associated with 2 times risk of Developing peripheral Neuropathy. The mean fasting Glucose in their study is 149±48mg%, mean HbA1c for development of the diabetic neuropathy is 7.9±1.38, Body mass index, hyper cholesterol and triglyceridemia levels were associated and higher incidence of Diabetic neuropathy, systolic BP average in these study is134$\pm$16.0.mmhg, higher the BMI higher the Incidence of diabetic Neuropathy they found average BMI of 25.4 $\pm$ 4.6.kg/met^2, and average triglyceride levels of 133± 44.

Study done by Sase *et al*., [5] found mean age of development of diabetic neuropathy is 50 years, among diabetic patients who had peripheral neuropathy, 62% are male and 38% female, showing males predominant than females they found 76% of diabetic neuropathy patients had predominantly Demyelinating plus Axonal type of neuropathy they found 72% of patients had Bi-lateral Symmetrical mixed (sensory and motor) Symptoms Predominant distal Involvement in 94% and 16% patient presented and pure sensory symptoms, 12% had pure motor symptoms.

Study done by Arindam Dutt *et al.*, [6] they studied 100 diabetic patients found that neuropathy is more in the age group of 50.44$\pm$10.35 years, found that 28% are male 31% are female, showing diabetic neuropathy effects females > males, fasting and postprandial Blood Glucose levels are higher in Neuropathic patients compared to non- Neuropathic group. Mean FBS (220$\pm$68 mg%), mean post prandial Blood sugar of (333$\pm$84 mg%), 18% of males and 12.82% of female who had Diabetic neuropathy were suffering from Hypertension.

Study done by Ozgur Boyraj *et al.*, [7] found mean age of Development of peripheral Neuropathy in Diabetic patient was 57$\pm$9.9 year, but obese patients mean age of 61.3$\pm$9 years, mean duration of diabetes to develop peripheral neuropathy was 9.1±8.5 years and 10.1±7.4 years in obese patients, mean HbA1c is 6.9±1.7 in normal diabetic and in Obese patient 7.9±1.4, mean BMI to develop neuropathy in diabetic patient is 25.5 $\pm$ 2.4 kg/met2 and in obese diabetics it is 27.9 $\pm$1.4.kg/met.

CONCLUSION

Diabetic neuropathy is common complication of Diabetes mellitus. It is generally considered to be related to duration and severity of hyperglycemia, usually more than 50% of patients with the duration of diabetes of 25yrs or more are affected, making it as the most common disease of Nervous system. It is well known that Diabetes mellitus is rising in an epidemic proportion in Indian subcontinent, prevalence of Diabetic Neuropathy in type -2 DM of this country was reported to be 17 to 19% and that of Automatic Neuropathy of 35% of peripheral neuropathy cases. Nerve conduction study shows abnormal conduction, predominantly of demyelinating type of neuropathy, Conduction velocity slowly decreases as duration of diabetes increases and directly related to blood sugar levels, conduction velocity improves with HbA1c levels returning to normal.

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