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COMPARISON OF AUTONOMIC DYSFUNCTION BETWEEN TYPE 1 AND TYPE 2 DIABETES MELLITUS

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ABSTRACT

Introduction: India has the highest incidence of diabetes mellitus, which is among the most commonly occuring Non Communicable Diseases in the world. One of the major complications of Diabetes Mellitus is Autonomic Nervous Dysfunction. In this study we compared nervous dysfunction in Type 1 and Type 2 Diabetes Mellitus along with their correlation with the duration of illness. **Methodology:** This study was conducted in 50 Type 1 and Type 2 Diabetes Mellitus patients respectively. The participants were examined for symptoms of autonomic nervous system function and tested for the same using conventional tests and were reported positive or negative for presence of autonomic nervous dysfunction. **Results:** The duration of illness in type 1 Diabetes Mellitus was 6 to 15 years and in type 2 diabetes mellitus was 8 to 18 years with a mean duration of 8.5 years and 14 years. The mean HbA1c in type 1 and type 2 diabetes mellitus patient was 6.22 ± 2.09 and 7.50 ± 2.45 respectively. Comparison of autonomic nervous system dysfunction was carried out and no significant difference was found between the heart rate and blood pressure variations in type 1 and type 2 diabetes mellitus patients. **Conclusion:** Based upon the findings of the study nerve damage was concluded to be the cause of autonomic nervous dysfunction in type 1 and type 2 Diabetes Mellitus patients and was found to be positively related to duration of illness.

KEYWORDS: Diabetes mellitus type 1, Diabetes mellitus type 2, autonomic Nervous Dysfunction.

INTRODUCTION

India has the highest incidence of diabetes mellitus, which is one of the most common non communicable diseases in the world.[1] Prevalence of diabetes in Indian adults in rural and urban area was found to be 2.4 % and 4-11.6%. There is a potential risk of the rise of prevalence of diabetes in the coming decades as shown by studies wherein high frequency of impaired glucose tolerance ranging from 3.6-9.1% was noted.[2]

The classification of diabetes mellitus includes type 1 and type 2 diabetes mellitus along with other specific diabetes like gestational diabetes, disease of pancreas, drug induced diabetes, genetic defect and diabetes occurring in syndromes.[3]

One of the commonest complications of diabetes affects the autonomic nervous system which can be classified on the basis of presence or absence of symptoms of the nerves or the organs involved.[4] Autonomic dysfunction in diabetes contributes significantly to 50% of 5 year mortality. Sudden death, increase complications after elective surgery, increased risk during anaesthesia and the significant increase in major microvascular complications have been observed and therefore it is important to screen for diabetes at 45 years of age.[5,6]

The incidence of autonomic neuropathy in Diabetes is difficult to ascertain.In most large series abnormal cardiovascular function was seen in 17 to 40% of randomly selected adult diabetic patients. Younger diabetics with longer duration of illness show abnormal cardiovascular symptoms in 15% and in 31% of teenagers.[7,8]

Autonomic neuropathy is a consequence of nerve damage. Autonomic nerve damage is irreversible by the time symptoms develop and carries a poor prognosis, however prevention is possible.[9,10]

MATERIALS AND METHODS

The study was conducted in the department of medicine of RKDF Institute of Medical Sciences, Bhopal. The study was conducted on 50 patients each diagnosed with type 1 and type 2 diabetes mellitus respectively. Heart rate variation during deep breathing, heart rate response to valsalva maneuver and immediate heart rate response to standing were performed to assess the parasympathetic function. Blood pressure response to standing and

sustained hand grip was used to assess sympathetic function. Standard protocols as described by DJ Ewing et al were used to perform the test and calculate the score as normal, borderline and abnormal value.[12]

RESULTS

The average age of the participants is 45.36 ± 15.07 years (range 18-48 years) for type 1 diabetes and 34.18 ± 12.56 years (range 24-54 years) for type 2 diabetes patients.

The duration of illness in type 1 DM patient was 6-15 years (mean 8.5 years) and 8-18 years (mean 14 years) in type 2 DM patients.

The comparison of FBS, PPBS and HbA1C between type1 and type2 DM patients shown in table1.

Table 1: Comparison of FBS, PPBS and HbA1C.

	Type 1	Type 2	P value
FBS(MG/DL)	131.90±35.74	123.93±35.92	0.360
PPBS(MG/DL)	226.50±57.58	207.70±57.93	0.182
HBA1C	6.21±2.09	7.50±2.45	0.023 (statistically significant)

Autonomic dysfunction score was positive in 19 patients of Type 1 and 25 patients of Type 2 DM patients respectively which was found to be statistically significant (table 2)

Table 2: Distribution of autonomic score

Autonomic score	Type 1DM		Type 2 DM	
	N	Percentage	N	Percentage
Negative (<=5)	11	36.6	15	37.5
Positive (>=5)	19	64.4	25	62.5

Comparison of heart rate and BP is shown in table 3, the result were statistically insignificant (Student's t test). Autonomic score and study variables were compared using unpaired t test and a statistically significant difference was seen in positive and negative autonomic scores (Table 4).

Table 3: comparison of Heart Rate and BP response

	Type 1 DM	Type 2 DM	
Heart rate response to deep breathing	12.26±4.95	14.04±5.26	0.189
Heart rate response to valsalva maneuver	1.07±0.27	1.18±0.19	0.051
Immediate heart rate response to standing	1.01±0.15	1.07±0.19	0.158
BP response to standing	14.88±7.51	10.96±9.31	0.063
BP response to hand grip	14.40±5.57	12.24±3.95	0.061

Table 4: Comparison of study variables in autonomic score.

Variables	Negative score	Positive score	P value
Age in years	42.91±12.59	54.43±15.12	0.001
Duration of illness in years	5.39±3.06	10.96±6.95	0.001
Heart rate response to deep breathing	16.41±3.11	9.00±3.45	<0.001
Heart rate response to valsalva	1.27±0.13	0.91±0.25	<0.001
Heart rate response to standing	1.11±0.06	0.93±0.16	<0.001
BP response to standing	12.18±4.69	17.00±8.63	0.023
BP response to hand grip	17.09±4.44	12.29±5.52	0.002
Glycosylated Hb	5.98±1.41	8.24±2.59	0.001

DISCUSSION

The duration of disease increases the incidence of autonomic dysfunction. Maximum number of patients seen among type 1 and type 2 diabetes group were between the age of 25-30 years and 40-45 years. Dyrberg et al reported incidence of autonomic neuropathy in diabetes of upto 10 years duration and >10 years duration as 15% and 60% respectively.[13] Similar results were reported by M Lakhotia et al with an incidence of 80% with 5 years duration of illness.[14]

Autonomic dysfunction was commonly seen in patients with poor glycemic control. The mean HbA1C in type 1 and 2 DM was 6.21 ± 2.09 and 7.50 ± 2.45 respectively. Significant symptomatic improvement was seen after 6 months of strict metabolic control in 22% patients by RC Gupta et al.[15]

It can be concluded that nerve damage is the probable cause of autonomic dysfunction in type 1 and type 2 diabetes mellitus. Autonomic dysfunction is directly related to duration of diabetes. Autonomic dysfunction

can be controlled by strict glycemic control in diabetes and therefore patient should undergo autonomic function test at an early stage of disease.

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