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COMPARISON OF THE DEVELOPMENT OF STROKE IN HYPERTENSIVE AND NORMOTENSIVE DIABETICS

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ABSTRACT

Objective: Diabetes Mellitus plays an important role in the development of stroke in hypertensive patients. This study was undertaken to evaluate the development of stroke in normotensive and hypertensive diabetics in adult population of Malakand division.

Methods: The present study was carried out on normotensive and hypertensive diabetics of 40-70 years of age. The first two groups were selected from Medical Outdoor Patients Department (OPD) of xxx Teaching hospital, while the third group of healthy control subjects were taken from the friends and staff members of yyy medical college. Weight, height, body mass index, systolic blood pressure, diastolic blood pressure and stroke amongst the three groups were measured and compared.

Results: Systolic and diastolic blood pressure and stroke were significantly higher in hypertensive diabetics than normotensive diabetics and healthy control subjects.

Conclusion: The occurrence of the development of stroke is different amongst the two groups of diabetics, earlier in hypertensive diabetics than normotensive diabetics.

Key Words: stroke, hypertension, diabetes.

INTRODUCTION

Diabetes is frequently associated with elevated concentrations of total plasma triglyceride and low-density-lipoprotein (LDL) cholesterol and reduced concentration of high-density-lipoprotein (HDL) cholesterol[1].

The diabetes has a greater adverse effects on triglyceride and lipoprotein cholesterol concentrations in hypertensive than in normotensive diabetics and that this may explain the greater increase in risk of atherosclerosis, which leads to stroke[2].

In both hypertensive and normotensive diabetics, microalbuminurea is associated with poorer blood glucose control, raised arterial blood pressure, lipid abnormalities, and in longitudinal studies is strongly predictive of stroke[3]. There is evidence that the high glucose concentration is associated with lipid alterations such as hypertriglyceridemia, increased LDL cholesterol and decreased LDL cholesterol-with increased tendency to hypertension and stroke[4]. The nonenzymatic glycosylation of proteins, such as collagen and elastin, caused by increased blood glucose concentration further injures the arterial wall, which leads to atherosclerosis and finally to stroke[5]. Coronary heart disease (CHD), stroke, and peripheral vascular disease are substantially more common in hypertensive diabetics than normotensive diabetics[6].

The Diabetic state itself, particularly hyperglycemia is likely to contribute to excessive cardiovascular risk such as stroke in hypertensive diabetic than normotensive diabetics[7].

The role of viscosity in the development of cardiovascular complication like stroke is more prominent in hypertensive diabetics as compared to normotensive diabetics[8].

Numerous epidemiological studies have found that elevated total cholesterol and especially the LDL cholesterol plays a major role in the development of stroke in hypertensive diabetics[9]. Pooling Project Group: Diabetes with

development of stroke in hypertensive diabetics[9].hypertension is an important risk factor for myocardial infarction and stroke [10,11].

MATERIALS AND METHODS

The present study was conducted in Physiology Department of Saidu Medical College, and Department of Medicine, Saidu Teaching Hospital. A total of 100 subjects were selected. Out of these 34 were control healthy subjects, 33 were normotensive diabetics and 33 were hypertensive diabetics. The control healthy subjects were selected from friends and college staff members while the normotensive diabetics subjects and hypertensive diabetics subjects were collected from the Medical OPD of xxx Teaching Hospital.

Both males and females between 40-70 years of age were included in this study. Subjects were excluded from this study participation that had a medical history of disease other than diabetics and hypertension or were taking any medication known to affect metabolism.

Health Scale (model ZT-120) was used to measure weight and height, Weight was assessed at two different points during interview, and the two were averaged for these analyses. It was measured to the nearest 0.5 kg. Height was also assessed at 2 different points during interview, and the two readings were averaged for these analyses. It was measured to the nearest 0.1 cm.[12] Body mass index (BMI) was determined by dividing weight (wt) in kilogram by height (ht) in meters square ($BMI=kg/m^2$)

Blood pressure data was obtained, after at least 5 minutes of rest, with subjects in seated position. A mercury sphygmomanometer (model SM-300), with an appropriate sized cuff covering two third of the upper arm, was used. The onset of the first tapping sound was taken to indicate the systolic blood pressure, while the point of complete disappearance of the sound (Korotkoff V) was taken to indicate diastolic blood pressure. The mean of three reading was recorded[12]. Blood pressure level that exceeded 145-150 / 90-95 mm Hg was taken as hypertension in adult[13].

Three ml of fasting blood sample (10-12 hours fast) was collected from each subject by venepuncture of antecubital vein under aseptic conditions in a routine morning visit to medical OPD of Saidu Teaching Hospital. Blood sample was carefully shifted in a clean test tube containing 0.5 ml of 3.8% trisodium citrate solution for estimation of serum glucose concentration.

RESULTS

The results of our study are given in tabulated form as follow:-

Table-1 Comparison of seven parameters between control (healthy) subjects and normotensive diabetics.

S.No	Parameters	Control Subjects	Normotensive Diabetics
1	Weight (kgs)	70	72
2	Height (m^2)	1.8	1.75
3	BMI (kgs/ m^2)	21.60	23.06
4	Systolic BP (mm.Hg)	125	127
5	Diastolic BP(mm.Hg)	85	85
6	Blood Glucose (mg/dl)	124	190**
7	Stroke	0	3*

Values are given as meangnificant) when normotensive were compared with obese nor

Table-2 Comparison of seven parameters between control (healthy) subjects and hypertensive diabetics.

S.No	Parameters	Control Subjects	Hypertensive Diabetics
1	Weight (kegs)	70	75
2	Height (m^2)	1.8	1.9
3	BMI (kegs/ m^2)	21.60	23.5
4	Systolic BP (mmHg)	125	170**
5	Diastolic BP(mmHg)	85	100**
6	Blood Glucose (mg/dl)	124	205**
7	Stroke	0	9**

Values are given as mean ± SEM * $p \leq 0.05$ (significant) ** $p \leq 0.01$(highly significant) when normotensive were compared with obese normotensive.

Table-3 Comparison of parameters between Normotensive Diabetics and Hypertensive Diabetics.

S.No	Parameters	Normotensive Diabetics	Hypertensive Diabetics
1	Weight (kgs)	72	75
2	Height (m^2)	1.75	1.9
3	BMI (kgs/ m^2)	23.06	23.5
4	Systolic BP (mm.Hg)	127	170**
5	Diastolic BP(mm.Hg)	85	100**
6	Blood Glucose (mg/dl)	190	205*
7	Stroke	3	9**

Values are given as mean ± SEM * $p \leq 0.05$ (significant) ** $p \leq 0.01$(highly significant) when normotensive were compared with obese normotensive.

Table 1 shows the comparison of weight, height, body mass index, systolic blood pressure, diastolic blood pressure, blood glucose concentration and stroke between the healthy control subjects and normotensive diabetic subjects. No significant differences were found in the parameters like weight, height, body mass index, systolic blood pressure, diastolic blood pressure between the two groups, while the parameter like stroke was statistically significantly higher in normotensive diabetics than healthy control subjects and the parameter like blood glucose concentration was statistically highly significantly different between the two groups, greater in normotensive diabetics than healthy control subjects.

Table 2 shows the comparison of weight, height, body mass index, systolic blood pressure, diastolic blood pressure, blood glucose concentration and stroke between the healthy control subjects and hypertensive diabetic subjects. No significant differences were noted in the parameters like weight, height and body mass index between the two groups, while the parameter like systolic blood pressure, diastolic blood pressure, blood glucose concentration and stroke were statistically highly significantly greater in hypertensive diabetics than healthy control subjects.

Table 3 shows the comparison of weight, height, body mass index, systolic blood pressure, diastolic blood pressure, blood glucose concentration and stroke between the normotensive diabetic subjects and hypertensive diabetic subjects. No significant differences were in the parameters like weight, height and body mass index amongst the groups, while the parameter like blood glucose concentration was statistically greater in hypertensive diabetics the normotensive diabetics and the parameters like systolic blood pressure, diastolic blood pressure and stroke were highly significantly greater in hypertensive diabetics than normotensive diabetics.

DISCUSSION

The aim of the study, was to compare the development of stroke amongst normotensive and hypertensive diabetics. We observed that the development of stroke is significantly greater in hypertensive diabetics than normotensive diabetics. This study is correlated with the study conducted by Haffner SM, Letho S, Ronnemaa T, pyorala K that cardiovascular disease accounts for 70% of total mortality, and all manifestations of cardiovascular disease, coronary heart disease (CHD) and stroke are substantially more common in patients suffering from hypertensive diabetics than normotensive diabetic[14]. Moreover, our study also has a correlation with the study conducted by Rainer C, Kawanishi DT, Chandraratna An, Bauersachs RM, Reia Cl, rahimtoola SH, meiselman Hj that hypertension in diabetics may be a determinant of stroke development in diabetic subjects because of its relation with the development of atherosclerosis in coronary blood vessels and as well as with increased pressure of blood in the small blood vessels of the brain[15]. The study conducted by Grotta J, Ackerman R, Correia J, Fallick G, Chang J.provides evidence that hypertension is present not only in subjects with acute brain infarction, but also in those with risk factors for stroke, and that these abnormalities are, to a considerable degree, chronic[16].

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