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The present study was carried out in diabetes mellitus cases to find out the prevalence and pattern of cardiovascular complications in diabetes mellitus and their relationship with various risk factors. Particular importance has been given to incidence of fascicular blocks, Master's two step excercise test, peripheral vascular disease, including latent peripheral vascular disease, microangiopathy and lipoprotein patterns in various cardiovascular complications associated with diabetes mellitus.

Seventy five unselected diabetic subjects (attending diabetic clinic and/or admitted to indoor medical ward of M.L.B. Medical College Hospital, Jhansi) have been taken up for present study. For comparative purposes, 25 age and sex matched healthy subjects were selected as control group. A detailed history, clinical examination was conducted in all the cases specifically for cardiovascular complications including second toe digital pressure, blood pressure recording in sitting lying and standing posture.

The diagnosis of diabetes mellitus was established by fasting blood sugar level (Folin Wu method, 1920), glycosuria and glucose tolerance test. Fundus examination, routine urine examination, serum cholesterol
(Zak et al., 1953), electrophoresis for lipoproteins and 12 lead electrocardiogram was done in all the cases. Master's two step exercise test was performed in 63 diabetics and 25 control subjects. Skin biopsy was done in all the cases including subjects of control group. Retinopathy, peripheral vascular disease and microangiopathy were divided in four grades.

Cardiovascular complications were observed in 65 diabetics (88.66%). The explanation for its high incidence has been given. There was increase in incidence of cardiovascular complications with advancing age and duration of diabetes. Males were effected more frequently. The mean serum cholesterol in diabetics was 257.3 mg% and the levels were significantly higher in comparison to control group. There was no significant difference from the cholesterol level in diabetics without cardiovascular complications. Hypercholesterolaemia was present in 34 (52.30%). Out of 65 cases, incidence of cardiovascular complications increased with increasing serum cholesterol. Type IIa hyperlipoproteinaemia was commonest lipoprotein pattern (30.76%) followed by type IV (13.85%) hyperlipoproteinaemia. Cardiac involvement was seen in 30 diabetics (40.0%), hypertension in 14 cases (18.67%), diabetic nephropathy in 14 cases (18.67%), diabetic retinopathy in 22 cases (29.33%), peripheral vascular disease
in 35 cases (48.0%) and microangiopathy in 48 cases (84.0%).

Cardiac involvement including stress test, cardiac involvement only (ischaemic heart disease, cardiomegaly and fascicular blocks) and ischaemic heart disease was observed in 46 cases (61.33%), 30 cases (40.0%) and 16 cases (21.3%) respectively. Angina pectoris was present in 10 cases (10.66%) and myocardial infarction was present in 6 cases (8.05%). Cardiomegaly was observed in 8 cases (10.66%) and fascicular block in 6 cases (8.0%). Stress test was positive in 16 diabetics (21.3%). Incidence of cardiac involvement and ischaemic heart disease increased with advancing age, prolongation of diabetes and increasing levels of serum cholesterol. Females were affected more frequently than males with above mentioned complications. 56.66% (17 out of 30) and 68.75% (11 out of 16) of diabetics with cardiac involvement and ischaemic heart disease respectively had hypercholesterolaemia and mean serum cholesterol levels were 266.67 mg% and 271.88 mg% respectively. Serum cholesterol levels were significantly higher in comparison to serum cholesterol levels of control group. There was no significant difference from serum cholesterol levels without these complications. Hyperlipoproteinaemia was present in 66.6% (20 out of 30) and 81.25% (13 out of 16) cases respectively. Type IIa was commonest hyperlipoproteinaemia observed in diabetics with cardiac involvement
and with ischaemic heart disease. It's incidence was 40.0% (12 out of 30) 81.25% (13 out of 16) cases respectively. Incidence of associated hypertension and nephropathy were significantly high in diabetics with above mentioned complications than diabetics without above mentioned complications.

In 6 cases of myocardial infarction, anterior wall and anterolateral wall myocardial infarction were equally frequent (33.23%) each. Incidence of lateral wall (16.6%) and inferior wall myocardial infarction (10.6%) were lower, myocardial infarction was painless in 3 cases (50.0%). Angina pectoris was present in 10 cases (13.25%).

Out of 8 cases of cardiomegaly, 4 (50.0%) were secondary to hypertension and 1 secondary to cor-pulmonale while cause remained obscured in 3 cases. It was probably due to cardiomyopathy as mentioned in discussion.

Fascicular blocks were present in 6 cases (8.0%). Majority of cases with fascicular blocks were from advanced age. R.B.B.B. was commonest fascicular block present singly or in combination in 4 cases (66.6%). Only R.B.B.B. was present in 3 cases (50.0%). L.A.H.B. , L.B.B.B. and R.B.B.B. with L.A.H.B. were equally common (16.6%) each. None of the case with fascicular block had any evidence of ischaemic heart disease. Its importance has already been discussed.

Stress test was positive in 16 cases (21.3%).
This incidence was significantly higher than that in control group. Significant number of diabetics below age of 40 years had positive stress test (21.43%). 21.2% (7 diabetics) cases above the age of 40 years had positive stress test. Stress test was positive in 16 cases (21.3%). This incidence is significantly higher than in general population. Significant number of diabetics below age of 40 years had positive stress test. 33.33% (2 out of 6) diabetics with fascicular block had hypercholesterolaemia.

Hypertension was present in 18.67% cases (14 out of 75). Females were affected more frequently than males. There was increase in incidence of hypertension with advancing age, increasing duration, and increasing levels of serum cholesterol. 78.57% (11 out of 14) of the hypertensive diabetics were having hypercholesterolaemia, mean serum cholesterol was 289.3 mg% ± 61.02 mg% and level were significantly high than level in normotensive diabetics and level in control group. Type IIa hyperlipoproteinaemia was commonest pattern (42.06%) followed by type IV pattern (28.6%). Incidence of cardiac involvement, ischaemic heart disease, myocardial infarction, nephrotic syndrome, retinopathy, peripheral vascular disease and microangiopathy were significantly higher among hypertensive diabetics in comparison to normotensive diabetics.
14 (18.66%) out of 75 diabetes had diabetic nephropathy. There was a definite increase in incidence of nephropathy from age of 31 years to 70 years. One case was present in age group of 11-20 years. Males and females were equally affected. There was increase in incidence of nephropathy with prolongation of diabetes. 64.3% (9 out of 16) diabetics with nephropathy had hypercholesterolaemia. Mean serum cholesterol level was 285.71 ± 24.57 mg% among diabetics with nephropathy and levels were significantly higher in comparison to diabetics without nephropathy and control group. Type IIa hyperlipoproteinaemia was commonest pattern followed by type IV pattern. Incidence of associated hypertension and cardiac involvement was significantly high among diabetics with nephropathy. There was a close association between nephropathy and retinopathy.

Retinopathy was observed in 22 diabetics (29.33%). Majority of diabetics with retinopathy were present in advanced age group. Males were affected more frequently than females. Incidence of retinopathy increased with prolongation of diabetes. 68.18% (15 out of 22) diabetics with retinopathy had hypercholesterolaemia and showed an increased incidence of retinopathy with increasing serum cholesterol. Mean serum cholesterol level was 279.54 mg% ± 47.45 mg% among diabetics with retinopathy and levels were significantly high in comparison to diabetics without retinopathy and control group. Type IV hyperlipoproteinaemia was commonest
pattern (27.3%), followed by type II pattern (13.6%). Hypertension was more frequently present in diabetics with nephropathy than diabetics without nephropathy and there was close association between nephropathy and retinopathy. Grade I retinopathy was present in 8 diabetics (36.36%), grade II in 5 diabetics (22.72%), grade III in 5 cases (22.72%) and grade IV in 4 cases (18.18%).

Peripheral vascular disease was present in 36 diabetics (48.0%). Gangrene was present in 4 cases. On excluding the cases of latent peripheral vascular disease (25 cases) which were diagnosed on the basis of low second toe digital pressure, the incidence of peripheral vascular disease reduced to 14.66% (11 out of 75 cases). There was increase in its incidence with advancing age, prolongation of diabetes. Male were affected more frequently than females. 55.55% (20 out of 36) diabetics with peripheral vascular disease had hypercholesterolaemia.

Mean serum cholesterol level were 257.0 mg% ± 50.2 mg% in comparison to control group, the levels were significantly high. But there was no significant difference from diabetics without peripheral vascular disease. Type IIa lipoproteinaemia was commonest hyperlipoprotein 36.1% followed by type IV pattern (16.7%). There was a close association between peripheral vascular disease and microangiopathy. Cardiac involvement, nephropathy and retinopathy
were more frequent in diabetics with peripheral vascular disease than without peripheral vascular disease.

Microangiopathy on histopathological examination of skin biopsy was present in 48 (64.01%) diabetics. This incidence is significantly high than among control group (20.0%). There was definite increase in incidence of microangiopathy with advancing age and prolongation of diabetes. Males and females were affected equally, 54.16% (26 out of 48) of the cases with microangiopathy had hypercholesterolaemia. The serum cholesterol levels were significantly higher than that of control group but there was no significant difference in comparison to diabetics without microangiopathy. Type IIa hyperlipoproteinaemia was commonest pattern followed by type IV pattern. There was close association between microangiopathy and peripheral vascular disease. Incidence of associated hypertension and nephropathy were more among diabetics with microangiopathy. Grade I microangiopathy was present in 22 out of 48 cases, grade II in 15 cases, grade III in 7 cases and grade IV in 4 cases.