BLOOD LIPIDS IN NON - OBESE PATIENTS WITH NEWLY DIAGNOSED DIABETES MELLITUS AND UNTREATED HYPERTENSION

Pages with reference to book, From 57 To 60

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Abstract

Serum cholesterol and triglycerides were measured in 3 groups of non-obese subjects. The groups comprised of 50 patients with newly diagnosed diabetes mellitus, 50 normoglycaemic hypertensives and 50 normal controls. The mean serum cholesterol and triglyceride values were significantly higher in patients with diabetes and hypertension as compared to the controls. Except for a weak correlation between ponderal index and triglyceride in cases of hypertension, the lipid values were unrelated to ponderal index in patient groups.

Type IV hyperlipoproteinaemia (Hy-pertriglyceridaemia) was the most common lipid abnormality being present in approximately one third of the patients and 18% of the controls. Type Ha and IIb lipoprotein abnormality were seen in a small percentage amongst the patient groups but not in the controls (JPMA 30:57, 1980).

Introduction

Chronic diseases such as diabetes and hypertension are important causes of morbidity and mortality. There is also a clinical impression that diabetes and hypertension are associated more often than accounted for by chance. These two conditions alongwith raised blood lipids are important risk factors for the development of atherosclerosis and may increase the risk by acting synergistically. The spectrum of complications of chronic diseases in the under-developed countries is beginning to attract attention. The lipid profile in diabetes and particularly in hypertension has not been thoroughly studied in Pakistan patients. While same disturbance of blood lipid is ex-pected in uncontrolled diabetes, the association between hypertension and hyperlipidae-mia is not clearly established. In this study the results of blood cholesterol and triglycerides estimation in non-obese patients with newly diagnosed diabetes mellitus and untreated hypertension have been reported and compared with non-obese normal controls.

Material and Methods

Fifty non-obese patients with newly diagnosed diabetes mellitus and 50 non-obese normoglycaemic untreated hypertensives attending the PMRC Research Centre's special clinic during 1978-79 were studied,

A similar number of non-obese controls were studied concurrently. The controls were drawn from patients attending the hospital for minor ailments.

All patients and controls had a complete history and physical examination and females were specially questioned about the intake of oral contraceptives Those with a possible secondary cause for hyperlipidemia i.e. nephrosis, hypothyroidism and biliary cirrhosis were excluded- The laboratory investigations included haemoglobin, glucose tolerance test, blood urea and urinalysis.

Blood samples for lipid estimation were drawn after an over-night fast. Serum cholesterol was estimated by Abell's method (Abell et al., 1952) and triglyceride using the method of Van Handel and Zilversmet (1957). The ponderal index was calculated as height (inches)/ 3weight (lbs) A ponderal index value of less than 12 denotes obesity.
Hyperlipidaemia was diagnosed when serum cholesterol was in excess of 280 mg",, and triglycerides higher than 200 mg%. A tentative categorisation of hyperlipoproteinaemia using the classification of Fredrickson et al (1967) was done as follows :-
Type Iia: Hypercholesterolemia alone.
Type Iib: Proportionate elevation of serum cholesterol and triglycerides.
Type IV: Hypertriglyceridaemia alone.

Results

Table I: Age & Sex Distribution in Non-Obese Subjects with Untreated Hypertension, Newly Diagnosed Diabetes Mellitus and Normal Controls.

Age (years)	*Hypertension* $n=50$		*Diabetes* $n=50$		*Controls* $n=50$	
	M	*F*	*M*	*F*	*M*	*F*
20 - 30	6	2	1	4	1	5
31 - 40	4	10	6	8	9	12
41 - 50	6	11	8	9	7	4
51 - 60	2	5	2	6	5	2
Above 60	1	3	5	1	1	4
Total	19	31	22	28	23	27
Mean age (yrs.) ± S.D.	42.22 ± 11.81		45.54 ± 12.21		42.50 ± 10.16	

Table I shows the age and sex distribution of patients with hypertension, diabetes and normal controls. There were 50 patientsin each group, with their sex distribution as follows:-
Hypertension group: 19 males and 31
females; Diabetic group: 22 males and 28

females; and Controls group: 23 males and
27 female.s
A vast majority of patients in each group were between the ages of 31-60 years. The (yrs +- S.D.) in 3 groups were:
Hypertension group42.22 + 11.81
Diabetic group 45.54 + 12.21
Controls 42.50 + 10.16

Table II: Mean values (± S.D.) of Ponderal Index, Serum Cholesterol and Serum Triglycerides in Controls, Patients with Untreated Hypertension and Newly Diagnosed Diabetes Mellitus (Statistical Significance Compared to Controls Given Below the Mean Values)

Investigations	Controls n = 50	Hypertension Group n = 50	Diabetes group n = 50
1.Ponderal index	12.62 ± 0.69	12.34 ± 0.71 *N.S.	12.31 ± 0.69 *N.S.
2.Cholesterol (mg%)	189.0 ± 31.85	216.0 ± 48.49 (.01>P>0.001)	223.0 ± 52.05 (P<.001)
3.Triglycerides(mg%)	149.00 ± 56.44	212.0 ± 109.20 (P<.001)	201.0 ± 110.89 (.01>P>.001)

*N.S. = Not significant.

Table II shows the mean values of pon-deral index, serum cholesterol and triglycerides in controls, patients with untreated hypertension and newly diagnosed diabetes. As expected the ponderal index was above 12 in cases and controls and there was no signifi-the three groups.
The mean blood cholesterol values in control group was 189 mg% as compared to 216 mg% in the hypertension group and 223 mg% in the diabetic group. The mean values of cholesterol in patients with diabetes as well as with hypertension were significantly higher than the controls.
The mean triglycerides values in the control group were 149 mg% as compared to 212 mg% in the hypertensive group and 201 mg% in the diabetic group. These values in the patient groups were again significantly higher than in the controls.

Table III: Results of Correlation Between Ponderal Index & Lipids Values in Patient Groups.

Relationship in variables	Hypertension group	Diabetes group
	Correlation Co-efficient	Correlation Co-efficient
i) Ponderal index with cholesterol	r = + 0.1080 N.S.	r = - 0.2059 N.S.
ii) Ponderal index with triglyeeride	r = - 0.2434 0.10>P>0.05	r = - 0.2249 N.S.

N.S. = Not significant.

Table III shows the correlation between ponderal index and lipids values in patients with hypertension and diabetes. In the group with hypertension there was no correlation between ponderal index and cholesterol (r = + 0.1080), and only a very weak correlation between ponderal index and triglyceride values (r = - 0.2434): 010 > P > 0.05).
In the group with diabetes mellitus the coefficients of correlation of ponderal index with cholesterol (r = - 0.2059) and ponderal index with triglycerides (r = -.0.2249) were not statistically significant
Type IV abnormality was seen in 34% of hypertensive group, 30% of the diabetic group and 18% of the controls.

Table IV shows the distribution of various types of hyperlipoproteinaemias in the 3 groups.

Type of Lipid abnormality	*Hypertension n=50*	*Diabetes n=50*	*Control n=50*
Type IV	17 (34%)	15 (30%)	9 (18%)
Type IIb	6 (12%)	7 (14%)	—
Type IIa	2 (4%)	1 (2%)	—

Table IV: Distribution (%) of Lipid Abnormalities in the Patient & Control Groups.

Type IIb was seen in 12% in the group with hypertension, 14% in patients of diabetes and none of the controls.
Type IIa was seen 4% of the patients with hypertension and 2% of those with diabetes mellitus.

Discussion

A higher frequency of atherosclerosis has been observed in diabetes mellitus. Certain epidemiological studies have shown that impaired glucose tolerance with hypertriglyceridemia is common in atherosclerosis (Ost-rander et al, 1967). Diabetes mellitus is also commonly associated with various endogenous hypertriglyceridemias. The mechanism responsible for elevated triglyceride level in diabetes has been the subject of considerable inquiry. Impaired removal of very low density lipoprotein (VLDL) has been observed in uncontrolled diabetes which has been attributed to a deficiency in lipoprotein lipase (Bagdade et al., 1968), while lipolysis continues to provide fatty acid substrates. In mild cases of maturity onset diabetes, over-production of triglycerides, due to hyperinsulinaemia has been noted (Bierman and Porte, 1968; Reaven et al., 1967). As obesity and possibly drugs can alter lipid levels, this study was restricted to non-obese subjects. The high triglycerides values in the untreated diabetes were probably the results of disturbed metabolism and were not related to ponderal index.
The cholesterol metabolism in diabetes has been relatively less thoroughly studied. In a carefully conducted metabolic study on Pima Indians suffering from diabetes mellitus, an over-production of both cholesterol and triglycerides was demonstrated (Benni-on and Grundy, 1977). While obesity has been known to increase cholesterol production (Miettinen, 1971), in the above mentioned study by Bennion and Grundy (1977), the weight was kept constant. The cholesterol in the present series of diabetic patients was elevated despite the absence of obesity. The cholesterol levels showed little correlation with the ponderal indices.
The association of hypertension and raised serum lipids is less clearly understood. The apparent association of hypertension and hyperlipidemia may be due to a more frequent measurement of lipids in hypertension or the observation that hypertensives tend to be more obese (Chiang et al., 1969). The role of anti-hypertensive drugs in raising serum lipids has also been mentioned (Ames and Hill, 1976; Chohan et al., 1978). In this study the group of patients with hypertension, obesity, diabetes and prior treatment were excluded by the design of the study. Both serum cholesterol and triglycerides were elevated compared to controls and the values were not related to ponderal index. It may be relevant to mention that in a recent western study serum triglyceride values were raised in patients with hypertension and there was evidence that this relationship was to a large extent independent of obesity (Thomas et al., 1977).
This study was conducted on a selected case material seen in hospital practice. However, there is suggestive evidence of lipid disturbance both in non-obese diabetics as well in the group with hypertension. These observations highlight the need for more comprehensive criteria for the control of diabetes which may include monitoring of lipids. The implications of elevation of lipids in patients with hypertension are obviously important. The mechanism of this association is not understood, but if confirmed by other studies there would be strong case for routine estimation of lipids in cases of hypertension.

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