

SERUM LIPID PROFILE IN KASHMIRI CHILDREN

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Abstract: 314 normal children in the age group of 5-14 years including 169 boys and 145 girls, were studied for their blood lipids and lipoprotein levels. Mean total cholesterol (Tch) of 172.8 mg/dl, triglycerides (TG) of 66.4 mg/dl, high density lipoprotein (HDLc) of 71.2 mg/dl, low density lipoprotein (LDLc) of 88.9 mg/dl and very low density lipoprotein (VLDLc) of 13.3 mg/dl was obtained. Lipid profile did not show any significant correlation with age and sex. Serum Tch and LDLc were higher in upper socio-economic group ($P < 0.01$). Tch and LDLc were higher in children taking high percentage of calories from fat and consuming more animal fats ($P < .01$) while HDLc value had an inverse relationship to these dietic rations.

Key words: lipids lipoprotein hyper-cholesteremia hyper-triglyceridemia

INTRODUCTION

Of all the risk factors, lipids and lipoprotein have a major role to play in premature atherosclerosis. Since the process of atherosclerosis starts in childhood, prevention of premature atherosclerosis should start from childhood (1). Variation in normal values, reported from different studies, can be attributed to many factors (2). Since Kashmiri's have peculiar dietary habit of taking excessive fats in the form of mutton and oil rich foods, this study was conducted to find out the normal values of lipids and lipoproteins in relation to these factors.

METHODS

314 normal children between 5-14 years of

age were selected from both rural and urban schools. Age was assessed from the school records and the history given by parents. Wherever possible, it was made sure that the parents of these children had not suffered from any ischaemic heart disease, hypercholesteremia or hyperlipoproteinemia. In doubtful cases parents were subjected to complete lipid profile analysis. Children suffering from any renal disorder or malnutrition were also excluded.

A detailed dictetic history was taken and on this basis, caloric, fat and animal fat consumption was calculated. The children were distributed into 3 groups as under :

| | <i>% of caloric consumption</i> | <i>% of calories from fat</i> | <i>Animal fat/vegetable fat ratio</i> |
|-----------------------|---------------------------------|-------------------------------|---------------------------------------|
| 1. Group I (High) | above 110% | above 30% | above 1.2 |
| 2. Group II (Average) | between 90-110% | 10-30% | 0.8-1.2 |
| 3. Group III (Low) | below 90% | below 10% | below 0.8 |

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Caloric requirements were determined by the formula given by Robson and Olefsky (3-4).

The studied groups were divided into 3 socio-economic groups (5). Blood samples were taken after overnight fast. Serum separated by centrifugation and stored in the refrigerator at 0-5°C. Lipid profile was estimated within 24 hrs. Serum Tch and TG were analysed by Spectrophotometric method (6-7) and HDLc by method of Bursten et al (8) and LDL by formula of Friedwarld (9).

$$\text{LDLc} = \text{Tch} - \left(\text{HDL Cholest} + \frac{\text{TG}}{5} \right)$$

$$\text{VLDLc} = \frac{\text{TG}}{5}$$

Statistical analysis was done by students 't' test and Karl Pearson formula.

RESULTS

314 children from 5-15 years of age were taken for study. These included 169 boys and 145 girls. 163 children (51.9%) belonged to rural and 151 (48.9%) to urban areas.

The levels of various serum lipids and

lipoproteins in different age groups are shown in Table I.

No lipid fraction showed any significant difference between two sexes ($P > .05$). However, Tch and LDLc values were significantly different in rural as compared to urban population ($P < .01$) (Table II).

Tch and LDLc levels were significantly higher ($P < 0.1$) in socio-economic class I as compared to class II and III. HDLc showed an inverse trend which was significantly higher ($P < .01$) in group III as compared to class I and II.

Table III shows lipoprotein levels in relation to dietary intake. Higher levels of Tch and LDLc were found in children taking higher caloric ratio and higher percentage of calories from fat as compared to those taking low fats.

DISCUSSION

Wide range of difference in the normal value of Tch in various studies have been reported (2, 10-15). Mirza et al (2) has shown a Tch level of 166.4 mg/dl as compared to 172.8 mg/dl in the present study. This difference is because of higher intake of fats and better

TABLE I : Age wise distribution of serum lipids and lipoprotein (mg/dl) in normal children Mean \pm S.D.

| Age group | No. | Tch | TG | HDLc | LDLc | VLDLc |
|-----------|-----|--------------|-------------|-------------|-------------|------------|
| 5-7 yrs | 96 | 169.2 (14.2) | 62.5 (11.5) | 67.3 (12.7) | 92.1 (19.3) | 12.3 (2.2) |
| 8-11 yrs | 116 | 176.3 (14.9) | 68.1 (12.1) | 74.2 (14.0) | 88.2 (23.7) | 13.6 (2.4) |
| 12-14 yrs | 102 | 173.0 (16.3) | 68.7 (10.9) | 72.1 (11.4) | 86.2 (24.0) | 13.8 (2.1) |
| Total | 314 | 172.8 (15.1) | 66.4 (12.4) | 71.2 (13.2) | 88.9 (22.9) | 13.3 (2.5) |

TABLE II : Showing lipid profile in various groups (mg/dl) Mean \pm S.D.

| Group | No. | Tch | TG | HDLc | LDLc | VLDLc | |
|-----------------------|------------|-----|----------------|---------------|----------------|--------------|--------------|
| Sex | Male | 169 | 172.3(15.9) | 66.7 (12.9) | 70.6 (12.9) | 88.9 (22.2) | 13.3(2.5) |
| | Female | 145 | 174.1 (15.2) | 66.5 (12.4) | 72.0 (13.6) | 88.5 (23.6) | 13.3 (2.5) |
| Area | Urban | 151 | 176.3 (16.4) | 66.0 (13.5) | 70.2 (13.6) | 93.9 (23.9)+ | 13.2 (2.9) |
| | Rural | 163 | 170.1 (14.2) | 66.9 (12.8) | 72.1 (12.7) | 84.8 (20.6) | 13.3 (2.6) |
| Religion | Muslim | 250 | 174.1 (15.8)** | 66.8 (13.0) | 71.3 (14.2) | 88.9 (24.8) | 13.3 (2.5) |
| | Non Muslim | 64 | 169.2 (14.2) | 64.2 (13.0) | 69.7 (11.4) | 87.3 (20.2) | 12.9 (2.6) |
| Socio-economic groups | I | 93 | 182.2 (16.3)† | 69.0 (11.3) | 67.3 (14.6)*** | 99.9 (20.3)† | 13.9(2.2)*** |
| | II | 127 | 173.8 (9.7)* | 65.7 (14.3) | 71.0 (10.9)* | 89.0 (16.4)x | 13.1 (3.0) |
| | III | 94 | 163.2 (15.3)* | 65.0 (11.0)** | 75.3 (13.6)* | 75.8 (22.3)* | 12.9 (2.1)** |

(+) P .01 Urban v/s Rural

(x) P 01 (***) P .05 -do- II v/s III

(++) P .05 Muslim v/s non-muslim

(*) P .01 (**) P .05 -do- I v/s III

(†) P .01 (***) P .05 S.E. group I v/s II

TABLE III : Showing lipid profile in relation to diet (mg/dl) Mean \pm S.D.

| Average dietary | Ratio | No. | Tch | TG | HDLc | LDLc | VLDLc |
|-----------------------------|---------|-----|-----------------|----------------|---------------|---------------|--------------|
| 1. Calories | High | 104 | 181.0 (16.4)* | 66.7 (13.5) | 67.5 (13.6)** | 99.8 (26.2)* | 13.3 (2.6) |
| | Average | 116 | 173.0 (11.1)* | 67.7 (13.1) | 71.8 (11.5) | 87.8 (16.3)+ | 13.5 (2.7) |
| | Low | 94 | 164.4 (14.7)** | 64.6 (11.5)*** | 74.8 (13.7)** | 76.5 (20.7)** | 12.8 (2.3)** |
| 2. Fat | High | 167 | 181.4 (15.5)** | 69.3 (11.4) | 67.3 (12.9)** | 100.4 (23.8)* | 13.8 (2.6) |
| | Average | 119 | 173.0 (10.3)* | 65.8 (13.8)+ | 72.1 (12.1) | 88.1 (16.0)* | 13.1 (2.9)* |
| | Low | 88 | 162.9 (15.4)*** | 63.8 (11.8) | 74.8 (13.9)** | 76.1 (22.5)** | 12.8 (2.4) |
| 3. Animal/ vegetable fat | High | 101 | 180.5 (16.4)* | 68.4 (10.9) | 67.3 (14.6)** | 99.5 (25.9) | 13.6 (2.1) |
| | Average | 106 | 173.9 (10.5)* | 66.5 (13.6) | 71.6(10.8) | 106.0 (29.5)* | 13.3 (2.9) |
| | Low | 107 | 165.5 (15.4)** | 64.6 (12.9)** | 74.6 (13.1)** | 78.5 (21.9)** | 12.9(2.7)*** |

(x) P < .01 (xx) P < .05 High v/s average ratio; (+) P < .01 (++) P < .05 Average v/s low ratio; (**) P < .01 (***) P < .05 High v/s low ratio

socio-economic conditions in Kashmir as compared to Aligarh, where Mirza et al conducted their study. This positive correlation with fatty diet and socio-economic status was shown by Srinivasan et al in his study (16), which demonstrated higher values of Tch as compared to the present study. His study was conducted in Bogalusa, where socio-economic conditions are better and fat intake is also more as compared to Kashmiris.

Rise of Tch and HDLc upto 11 years and subsequent fall in prepubertal age is in close conformity with earlier studies (2, 17). Mirza et al (2) found a fall of mean Tch from 175 mg/dl at 9 years to 171 mg/dl at 14 years. Others have shown gradual rise even upto 15 years (14,15). LDLc, VLDLc levels did not show any such change with the age. These changes are thought probably due to puberty effect (17). Sex did not shown any effect on the lipid and lipoprotein levels as noted in previous studies also (2, 10-11, 17).

A significant difference was noted in Tch and LDLc levels in the three social classes (P < .01). However, HDLc showed an inverse relationship with socio-economic status (P < .01). The results are similar to those noted by others (1, 14, 16, 18) Scrim Shaw et al (18) found a higher value of Tch in urban upper income group (187.2 mg/dl). The reasons for the lower values of HDLc in higher economic group may be due to an increase in fat stores in children of class I group compared to lower classes. Berenson et al (10) noticed an inverse relationship between obesity and

serum HDLc in upper class. This low HDLc may be one of the risk factors for coronary artery disease, most common in this group. Whether it is high fat diet taken by upper classes or some other complex factor need to be worked out. Tch and LDLc levels are significantly higher in urban population (P < .01) and in Muslims (P < .01) as compared to rural population and non-muslims respectively. This may be indirectly attributed to high fat consumption among muslim population of Kashmir particularly those belonging to urban area, who have comparatively better socio-economic status compared to rural population. Subjects consuming high caloric diet were seen to have significantly high Tch, LDLc levels (P < 0.1). Similar results were seen in those taking most of the calories from fats as reported earlier also (2, 15-18). HDLc values in relation to diet are significantly low in high fat, high calories and high animal diet groups (P < .01) making them prone to develop premature atherosclerosis. Therefore, it needs to be emphasised that dietary habits and socio-economic status must be taken into consideration, while stabilizing the norms for lipid profile in any community.

Taking into account the higher levels of lipids i.e. Tch, LDLc in Kashmiri children and higher incidence of hypertension in adults as compared to rest of India, it needs a further follow up study to find out whether this higher levels of total cholesterol (Tch) and LDLc in Kashmiri children is the cause of higher incidence of hypertension in adult Kashmiri population.

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