LIPID PROFILE NORMS IN INDIAN CHILDREN

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ABSTRACT

***Objectives**: To evaluate the lipid parameters in normal Indian children.*

***Design**: Cross-sectional.*

***Setting**: Hospital based.*

***Methods**: 410 children (siblings of hospitalized pediatric cases) between 3-12 years were evaluated for total plasma cholesterol (TC), triglycerides (TG) and high density lipoprotein cholesterol (HDL-C). The low density lipoprotein cholesterol (LDL-C) levels were derived from the above parameters using Fredrickson-Friedwald formula.*

***Results:** No significant difference was found between the sexes in any of the lipid parameters studied. The mean values were: TC-134. 5 mg/dl, TG-91.1 mg/dl, HDL-C-34.15 mg/dl and LDL-C-80.1 mg/dl. The suggested cut off limits for these parameters were 190 mg/dl, 150 mg/dl, 20 mg/dl and 130 mg/d respectively.*

***Conclusions:** Lipid profile norms and cut off levels to define abnormalities for Indian children were recommended. The HDL-C levels were lower than western data.*

Key words: *Lipid profile, Plasma- cholesterol, Coronary artery disease.*

Atherosclerosis is responsible for 50%.of deaths in the industrialized countries of the world(l). Coronary artery disease (CAD), which is one of it's manifestations in adulthood has been defined as the greatest epidemic mankind has ever faced(2). This menace has been recognized and is now under control in the developed countries but it's prevalence is on the increase in the third world countries including India(3).

Atherosclerosis probably begins in childhood. The postulated risk factors predisposing to atherosclerosis include hypertension, obesity, smoking, diabetes mellitus(4), and hyperlipidemia. Blood cholesterol has long been recognized as a major independent risk factor for CAD in adults(5). To bring about a primary prevention of CAD in adulthood, detection and intervention for hypercholesterolemia must begin at an early age(6). The present study was, therefore, designed to establish the norms of lipid profile in Indian children which are not readily available. In this context, the western norms may not be applicable for our setting in view of the divergent dietary, socio-cultural and life style factors.

Material and Methods

Four hundred and ten normal healthy children (199 boys and 211 girls)

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in the age group of 3-12 years who visited the hospital as siblings of patients constituted the subjects for this study. They originated from diverse socio-economic backgrounds with variable dietary habits. A detailed physical examination was done to rule out any systemic disorder. Blood samples were collected in fasting state in heparinized glass tubes. These were processed almost immediately, for further evaluation of total cholesterol (TC), serum triglycerides (TG) and high density lipoprotein cholesterol (HDL-C) using specific enzymatic methods in Olympus Auto-analyzer. Low density lipoprotein cholesterol (LDL-C) was derived from the above 3 parameters by Fredrickson-Friedwald formula(7): [LDL-C=(TC-HDL-C)-TG / 5]. Apart from these parameters, plasma SGOT, SGPT, urea and sugar were also assessed.

There were no significant differences in the lipid profile in relation to age or sex; the data was, therefore, pooled for analysis. Means and standard deviations were computed. Cut off levels were determined beyond 2 SDs, for detection of abnormal values.

Results

The lipid profile norms estimated from the current study are summarized in *Table* I. along with the suggested cut off values.

Discussion

Lipid levels vary widely with geographical areas, dietary and profile other socio-cultural habits. It is, therefore, prudent to establish normative data for each community. In view of the paucity of data in the Indian context, the current study was designed.

The total plasma cholesterol levels (TC) remained static from 3-12 years and

TABLE I - *Lipid Profile Norms*

Parameters	Mean 1: SD (n=410)	Range	Suggested cut-off values
TC (mg/ dl)	134.5±27.1	84-247	190
TG (mg/dl)	91.1±29.85	27-185	150
HDL-C (mg/ dl)	34.15±13.05-	12-86	20
LDL-C (mg/ dl)	80.1±21.65	32-202	130
TC/HDL-C	4.3±1.4	1.49-8.3	5.5
LDL-C/HDL-C	2.65±1.11	0.67-7.87	4.9

TC=Total cholesterol; TG=Triglyceride; HDL-C=High density lipoprotein-choleserol; LDL-C=Low density lipoprotein-cholesterol.

no significant difference was observed between the two sexes. These findings are in agreement with the Bogalusa heart study(8), but the mean plasma cholesterol level (134.5 mg/dl) is much lower as compared to Western data (170 mg/dl)p). Similarly, high density lipoprotein cholesterol (HDL-C) levels also did not differ much between the two sexes and the different age groups, and the mean HDL-C level (34.15 mg/dl) was considerably lower than it's American counterpart (72.9 mg/dl)(9). The comparatively lower levels of total cholesterol and HDL-cholesterol in the current study are in agreement with the observation of generally lower values in less developed countries(l0).

Hypercholesterolemia has been considered to be a major risk factor for evaluation of coronary artery disease, but there is no unanimity on the cut off point to be utilized in pediatric practice. In normal children, it varies between 200 mg/dl(12) to 230 mg/dl(13). However, in high risk children, if the total cholesterol 'goes beyond 160 mg/dl, then coronary protective interventions should be instituted(5). For practical purposes, hypercholesterolemia could be defined as a fasting cholesterol level greater than 190-200 mg/dl for either sex in the first two decades.

For serum triglycerides (TG), the recommended cut off limit (150 mg/dl) is in consonance with western reports(13). The low density lipoprotein cholesterol (LDL-C) levels did not show any significant difference in the various age or sex groups and were comparable with American children. The recommended upper limit of LDL-C is 130 mg/dl.

Rifkind *et al.* (14) suggest that HDL-C is a stronger predictor of CAD than total cholesterol and LDL-C. The Tromso study(15) even says that high HDL-C levels are protective against CAD at all ages.

Although HDL-C is a more useful predictor of CAD than TC alone(14), the ration of' HDL-C to TC or HDL-C to LDL-C may be even more predictive(16). The TC/HDLC (atherogenic index, ideal ratio being 5) and LDL-C/HDL-C (ideal ratio-3.5) have been used as markers of coronary atherosclerosis(17). These ratios have received limited attention in pediatric literature. It is known that correlation of TG with LDL-C is lower in children than adults (0.8 *vs* 0.9) because of higher HDL-C and lower LDL-C levels in children.

In conclusion, keeping the cut off limits of TC at 190 mg/dl, LDL-C at 130 mg/dl, TG at 150 mg/dl, and HDL-C at 20 mg/dl, it should be possible to screen out children with "abnormal lipid profile". Such children should be kept on a long term follow-up with periodic assessment for development of CAD. In view of constraints of a developing country, this screening could be considered for children who have a strong family history of CAD or hyperlipidemia.

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