IS IT JUSTIFIED TO USE REFERENCE RANGE OF LIPID PROFILE IN HEALTHY NEWBORNS SAME AS THAT OF ADULTS?
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ABSTRACT: OBJECTIVE: To develop the reference range of lipid profile in healthy newborns. METHODS: Design: Cross-sectional study in a tertiary hospital setting. 100 neonates 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: The normal ranges for the analyzed parameters for the newborns were – TC = 40-201 mg/dl; TG = 17-327 mg/dl; HDL-C = 07-83 mg/dl; LDL-C = 10-118 mg/dl. It was observed that lipid profile values in the newborn are much lower than the adult’s lipid profile values. CONCLUSIONS: Lipid profile norms and cut off levels need more evaluation to define normal reference range and predict the consequences of dyslipidemia in later life of Indian children.

KEYWORDS: Atherosclerosis, lipid profile, newborns, dyslipidemia.

INTRODUCTION: World Health Organization (WHO) has drawn to the fact that ischemic heart disease (IHD) is our modern epidemic.¹ Until now, cardiovascular risk factors were more prevalent in the developed countries.² However, the World Health Report 2002, indicates a rise in their prevalence even in the developing countries.³ The evidence that CVD may originate in childhood and adolescence leads to the need for investigating the risk factors during this period in order to propose earlier and possibly more effective interventions to reduce morbidity and mortality rates.⁴ Childhood obesity can cause the development of cardiovascular risk factors.⁵ ⁶ The children and adolescents with high cholesterol levels have more chances of coronary artery disease in late life, than those who are having normal cholesterol levels. This means atherosclerosis processes start from childhood.⁷ Dyslipidaemia when diagnosed in childhood predicts the development of clinical atherosclerotic disease in adulthood.

Ever since we became aware of the abnormally high incidence of coronary artery disease amongst Indians, there always has been an ever-growing need for study of lipid values amongst Indian children.⁸ So children who are at highest risk for development of accelerated atherosclerosis must be identified earlier by screening lipid profile levels in them. It has been stated that there is an inverse relationship between birth weight and mortality from coronary heart disease. Incidence of CHD is higher in babies with histories of low birth weight, low weight at the age of 1 year and also in premature neonates.⁹

Normal lipid profile varies in different countries according to its ethnicity, geographical area, dietary pattern and life style. In this context, the western norms may not be applicable for our settings.¹⁰ In Indian settings the normal reference ranges available are usually of adults. We intended to evaluate the reference range of lipids in neonates so as to identify the ones at risk, and thereby making them aware to be cautious so as to delay the onset of atherosclerosis.
MATERIAL AND METHODS: 100 Neonates visiting Christian Medical College and hospital, Ludhiana were the subjects for this study. There were 50 males and 50 females having a mean birth weight of 2.7 Kg The blood samples (serum) of neonates which were received for routine neonatal screening as per hospital policy in the clinical biochemistry lab of Christian Medical College and hospital, Ludhiana were evaluated for lipid profile.

All these samples were received within 72 – 96 hours after birth of the neonate. Mode of delivery was not considered as any criterion for inclusion in the study. These were processed, for evaluation of total cholesterol (TC), serum triglycerides (TG) and high density lipoprotein cholesterol (HDL-C) using specific enzymatic methods in modular P-800 Auto-analyzer. Low density lipoprotein cholesterol (LDL-C) was derived from the above 3 parameters by Fredrickson-Friedwald formula: 

\[ \text{LDL-C} = (\text{TC} - \text{HDL-C} - \text{TG}/5) \]

RESULTS: The lipid profile norms estimated from the current study are summarized in Table 1.

<table>
<thead>
<tr>
<th>ANALYTE</th>
<th>TC (mg/dl)</th>
<th>TG (mg/dl)</th>
<th>HDL-C (mg/dl)</th>
<th>LDL-C (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEAN± SD</td>
<td>109.28 ± 33.6</td>
<td>115.8 ± 61.8</td>
<td>35.3 ± 15.3</td>
<td>50.88 ± 23.3</td>
</tr>
<tr>
<td>RANGE</td>
<td>40 – 201</td>
<td>17-327</td>
<td>07-83</td>
<td>10-118</td>
</tr>
</tbody>
</table>

Table 1: Lipid profile ranges in healthy newborns. (n=100)

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

DISCUSSION: Lipid levels vary widely with geographical areas, dietary and profile of 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.

From the results, it can be observed that lipid profile values in the new born baby are very much different from the adult population. It shows that all the values are very much lower than the adult's lipid profile values. The lower value of cholesterol in serum is probably the cause of fall in plasma LDL-cholesterol concentration due to increase of its uptake by fetal adrenal gland for steroid hormone production, as postulated by Parker et al.\(^{(11)}\)

These values are also altered by the lipid status of the parents.\(^{(12)}\) In new born; liver cells and its enzyme are not well developed for lipid metabolism and so can contribute to lower values in lipid profile.\(^{(9)}\) 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 developing countries.

In conclusion, keeping the cut off limits of TC, LDL-C, TG and HDL-C, 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.

CONCLUSIONS:

1. Each and every neonate has a normal reference value corresponding to his age which can neither be comparable with other age groups of a child nor with the normal reference ranges of the adults.
2. The lipid profiles of the Indian children starting with new born need to have established their own normal reference ranges specific to the ethnicity of the area.

3. A wider section of the society in different regions needs to be screened for evaluating normal reference ranges of lipid profile in Indian population.

REFERENCES:


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