ESTIMATION OF REFERENCE INTERVAL OF LIPID PROFILE IN ASSAMESE POPULATION

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ABSTRACT

12hrs fasting samples of 1485 apparently healthy, Assamese population in the age group of 20-80 yrs., mostly from the urban area of Assam were tested for serum lipid profile that includes total cholesterol, triacylglycerol, high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) and very low density lipoprotein cholesterol (VLDL-C) over a period of three years. The values (median and range in mg/dl) obtained were 170 (93-263); 110 (40-256); 40 (23-73); 103 (40-173) and 22 (8-51) respectively. After grouping these subjects according to the age and sex no significant difference were observed between most of the groups. Median and upper range of total cholesterol, HDL-C and LDL-C were found to be higher in women than in men in all the age groups. But triacylglycerol and VLDL-C concentrations were observed to be higher in the men than women except in age group of 61-70 yrs. It can be suggested that lipid values obtained in this study can be used as the reference value, based on which clinical correlation can be made.

KEY WORDS

Reference Value, Lipid Profile, Age, Gender.

INTRODUCTION

There is a great variations of plasma lipid levels in different populations and usually are affected by age, sex, food habits, life style, socio-economic status, races, heredity etc. Different Methodology adopted for the determination of lipids and lipoproteins also may have some role in variation which could not be ignored. Though in clinical chemistry, reference values are commonly based on reference of the Western population, these usually do not match with the Indian population specially noted in case of lipid profile. As reference values are used by clinicians for interpretation of the results of measurements, it should correctly represent a defined group of population which should have close similarity with the patients under treatment coming for investigation. A reference value may be defined as a value obtained by observation or measurement of a particular type of quantity on a reference individual (1). Since till date no

well documented reference value of lipids of Indian Population are established, there is need for extensive study on lipid profile of Indian people. We have planned this study to evaluate the reference values of lipid profile of Indian Assamese population according to the guidelines of the National Cholesterol Education Program (NCEP) of USA.

MATERIALS AND METHOD

This study was conducted for a period of 3 yrs from 2002 to 2005 in the Central Clinical Laboratory, Dept. of Biochemistry, Gauhati Medical College, Guwahati (GMCH) and Deptt. of Pathology; Guwahati Neurological Research Center (GNRC Hospitals), Guwahati.

In this study, the reference population had been selected randomly from the different areas (mostly urban) of Assam, attending the Laboratory coming for executive and regular health check up after excluding the subjects as per the criteria given in the Table I.

Total 1485 subjects were selected for the study in the age group of 20 yrs to 80 yrs, out of which 840 were male and 645 were female. 12 hrs overnight fasting clotted venous blood samples were collected irrespective of seasonal variations

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Table I: Exclusion criteria based on history and clinical examination for defining reference individuals (2)

Diabetes Mellitus	Excessive body weight
Dyslipidemias	Smoking
Hypertension	Alcohol abuse
Cardiovascular disease	Pregnancy
Medication	Strenuous exercise
Renal Disease	Caffeine intake
Endocrine Disorders	Use of OCP
Liver obstruction	

throughout the year. Analysis was done within 4 hrs of collection.

The parameters of serum lipid profile were analyzed using Dade Dimensions (Dade AR). Serum Total Cholesterol was estimated by Cholesterol Oxidase Method whereas estimation of Triacylglycerol (TAG) was done by Lipase/ G-ol dehydrogenase Method. Direct: non immunological Method was used for determination of High Density Lipoprotein Cholesterol (HDL-C). Very Low Density Lipoprotein Cholesterol (VLDL-C) and Low Density Lipoprotein Cholesterol (LDL-C) were estimated using the Friedewald's formula. After eliminating the results of the lipemic samples the 98 percentile of central results were statistically evaluated. The results outside these limits were eliminated before the final median and central 95 percentile were calculated. Out of the 1485 subjects taken for the study, 1378 individuals belonging to age group 20-80 were selected for the study. The reference population was grouped according to the age and sex. The 97.5 percentile and 2.5 percentile formed the upper and lower reference limits of the population. SPSS package was utilized for statistical analysis.

To ensure the accuracy and precision of the test results both the laboratories participated in external and internal quality control programs (CMC , Vellore and BIORAD) routinely. The internal quality control check was done everyday and Standard

Deviation (SD) and Coefficient of Variation (CV) were calculated accordingly in Table II. It gives a overview of the quality control material used for the evaluation of the assay along with the day to day coefficient of variation.

RESULTS

The results obtained for the analytes used to measure the lipid profile are tabulated in the Table III

The reference intervals which have been utilized by the laboratories are tabulated along with the results so as to enable us to compare the results obtained from our study.

The median and upper range for total cholesterol, HDL cholesterol and LDL cholesterol concentrations were observed to be higher in women in comparison to men in all the age groups. Whereas in cases of TAG and VLDL cholesterol, concentrations were observed to be higher in the men than women except in age group of 61-70 yrs where reverse is observed.

The reference range for total cholesterol was observed to be higher for both the sexes in all the age groups than the reference range used in our labs. But the upper limit of the reference range of triacylglycerol was found to be higher in men than women except for the age groups more than 60 yrs where the upper limit of triacylglycerol was slightly higher in women than men.

In our study we have observed that the median value of total cholesterol and HDL-C were gradually increased as the age increased particularly in case of female. The reference range and median for HDL cholesterol were found to be higher in women than men in all the age groups. The reference range and median for LDL cholesterol were found to be higher for females in all age groups with a wider reference range than the reference range used in the laboratories. The reference range and median for VLDL cholesterol were found to be higher in men than women except for the age group >60 yrs,

Table II: Comparision of quality control material lypocheck level I & II from BIORAD with the mean obtained in the laboratories and the everyday percentage of coefficient of variations

Analytes	Reference Mean		Mean obtained in GMCH		Mean obtained in GNRC		% of CV in GMCH		% of CV in GNRC	
	Lev I	Lev II	Lev I	Lev II	Lev I	Lev II	Lev I	Lev II	Lev I	Lev II
T.Chol	250	94.3	251.3	93.2	250.6	94.4	1.4	2.1	1.3	2.0
TAG	184	89.7	183.2	89.1	184.6	89.5	2.2	3.0	2.5	2.9
HDL-C	62	23.4	61.4	24	62.3	23.1	3.2	3.7	3.0	3.5

Table III : Reference ranges for lipid profile obtained in our study with comparison of the reference range used at our Labs

Age groups in yrs.	Sex		T.chol		TAG		HDL-C		LDL-C		VLDL-C	
			Median	Range	Median	Range	Median	Range	Median	Range	Median	Range
21-30	M	34	157.5	98-206	138	57-253	35	27-45	92	57.6-143.2	28.2	11.4-50.6
	F	26	159.5	93-236	90	60-176	40	28-52	101.7	44-170.6	18.8	12-35.2
31-40	M	106	163	99-234	131	46-256	36.5	23-51	96	47.2-141	26	9-51.2
	F	120	166.5	108-226	106	41-206	40	24-57	102	41.2-156	21	8.2-41
41-50	M	168	164.5	102-227	121	40-216	38	24-53	96.5	40.4-156	24	8-45
	F	203	180	119-244	108	47-204	42	28-59	109	61-163	21.6	9-40.8
51-60	M	220	167.5	104-232	119	43-226	38	26-53	99.8	50-160	24	8.6-45.2
	F	165	187	125-253	113.5	45-206	44	28-62	116	61-173	23	9-41.2
61-70	M	191	167	104-229	102	42-180	39	26-56	102	50-152.2	20	8.4-36
	F	71	193	131-263	109	51-185	48	29-69	115	57.2-168	22	10-37
>70	M	61	158	97-231	103	52-176	41	24-59	91.8	47-140	21	10.4-35
	F	13	198	136-245	98	64-225	50	28-73	106.5	60.2-153	20	13-45
Total	M	780	165	97-234	113	40-256	38	23-59	97	40.4-160	23	8-51.2
	F	598	180	93-263	108	41-225	43	24-73	109	41.2-173	21	8.2-45
Over all		1378	170	93-263	110	40-256	40	23-73	102.9	40.4-173	22	8-51.2
Ref. Range				0-200		0-200		40-60		0-130		0-50
used in Labs												

where the median was slightly higher in women.

The reference range for total cholesterol was found to be wider in all the age groups for both the sexes than the reference range used in the laboratories.

Fig1: Graphical representation of the overall results of the different parameters of lipid profile

The reference range for TAG also found to be wider in men of age group 21-60 yrs and for females it is wider in the age group 31-60 yrs and >60 yrs. But surprisingly in the age group 61-70 yrs in both the sexes and in males in the age group >70 yrs and in females of 21-30 yrs the range is narrower than the range used in the laboratories. The reference range for LDL cholesterol was found to be wider in both the sexes for all the age groups than the reference range used in the laboratories. For HDL and VLDL cholesterol the reference range were found to be almost similar to that used in our laboratories. No significant difference were observed between most of the groups.

DISCUSSION

The recommended procedure by different authorities like IFCC, NCEP (3, 4) to identify, collect and measure enough samples from a sufficiently large reference population is not feasible for most laboratories, which thus have to rely on literature data or manufacturers' inserts sheets (5).

The abnormalities of blood lipids are related mainly to different dietary habits of people, lifestyle, heredity along with the other factors as we have mentioned in the section of introduction. When we compare our data with some recent studies done on Indian people of other region, we have found that our values

did not differ much with the values of those studies (6,7). Though it seems lipid levels in Indians are on an average less, compared to population abroad, except for triacylglycerols (8), it is observed that the values of present study follows a similar pattern as in some of the foreign countries (9). Probably due to the health consciousness and public awareness regarding the role of dietary habit and lifestyle on the occurrence of heart disease, an uniform pattern of living quality and healthy food habit has put the population of different regions of India on a similar plateau.

The observed slightly wider range of lipids of our study than the reference range used in our labs were probably due to the sedentary lifestyle of Assamese people along with lack of exercise mainly in urban areas. However the median values seem to be similar in comparison with available literature data.

Assam is a North Eastern state and GMCH and GNRC are the two main referral centers for the whole North East. Keeping in mind this fact we would like to expect further detailed study among NE population to establish the reference range of lipid profile as there is a great variations in dietary habit and life style among Assamese population and the people of other North Eastern states.

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