

Lipid and Lipoprotein Concentrations Among Andhra Populations: Need of Population Surveys

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INTRODUCTION

Lipids are important dietary constituents in human metabolism. Elevated levels of blood lipids especially cholesterol is the major risk factor for heart diseases and each 1% raise in cholesterol is associated with an approximate 2% increase in coronary heart diseases (CHD). Many epidemiological studies have established that LDL is directly proportional and HDL is inversely proportional to CHD. Hyperlipidaemia and lipoproteinemia are responsible for clinical manifestation of atherosclerosis. The concentration of blood lipid in an individual or population is modulated overwhelmingly by factors such as social, behavioural, physiological and genetics. It is estimated that over 60% of the variability in serum lipids is genetically determined and most of the variation being due to polygenic influences. Interaction between the later and environmental factors is probably the commonest cause of hyperlipidemia in the general population. (Thompson, 1990).

CHD is the third largest cause for clinical mortality in India after infectious diseases and tuberculosis. Several researchers revealed that the Indians, because of high serum cholesterol lipoprotein (a), Lp(a), insulin resistance syndrome, vitamin E and vitamin C deficiency and genetic make-up are prone to CHD and diabetes. (Bhatnagar, 1995). Further, Indians are susceptible to atheroma 15-20 years ahead of the west and they develop atheroma even at lower concentration of lipids (Krishna Swamy et al 1989) than western people. So, there is a need to develop guidelines and standards for lipid and lipoprotein concentration based on Indian populations. But we still depend upon western standards to diagnosis hyperlipidemia in clinical manifestation of atherosclerosis. In spite of Indians greater genetic and cultural diversity only few populations are covered until now and data on lipid variation is very scanty. So, keeping this in view, lipid (TC and Tg) and lipoprotein (HDL, LDL and VLDL) profiles among six Andhra populations are presented.

MATERIAL AND METHODS

A total of 600 individuals aged between 40-55 years were selected from six populations viz: Vysya, Brahmin; Reddy, Relli, Jalari and Vadabaliya living in Visakhapatnam City. 5 ml intravenous blood was drawn from each individual in resting position after overnight fasting in heparin contained vacutainers. The blood was transported to a diagnostic laboratory in Visakhapatnam City where Lipid and Lipoprotein analysis was performed by using enzymatic kit supplied by Tran-Gene-biotech Ltd. in an auto analyzer. Statistical analysis of data such as range, mean and standard deviation were calculated by SPSS (8.0) package.

RESULTS

Table 1 shows range, mean and standard deviation of lipids among six Andhra populations. If six populations club together, total cholesterol (TC) vary between 81 mg/dl to 316 mg/dl. The TC is found to be high among Relli (193.94 mg/dl) where as the Brahmin recorded the lowest total cholesterol (168.40 mg/dl). The mean Tg ranges 39 mg/dl to 620 mg/dl. The Relli population exhibited the highest mean Tg (226.24 mg/dl) while the lowest is reported among Vadabaliya (106.72 mg/dl). If males and females are taken separately, the female recorded high mean values than males for total cholesterol. However, Relli males and females recorded high mean values for total cholesterol (TC) and triglycerides (Tg).

Table 2 shows range mean and standard deviation of lipoproteins. The range of HDL vary from 18 mg/dl to 61 mg/dl. The Reddy recorded the highest mean HDL (41.34 mg/dl) while the Relli recorded the lowest value (32.92 mg/dl). The LDL and VLDL ranges from 33 mg/dl to 231 mg/dl and 7 mg/dl to 124 mg/dl respectively. The highest mean LDL and VLDL are recorded among Relli (114.29 mg/dl)(44.93 mg/dl). If males and females are considered separately, the females in the present study showed high mean HDL and LDL levels than males, but males reported high mean VLDL values than females

Table 1: Range and mean values of lipids among Andhra populations

Population	Lipids mg/dl			
	Tc		Tg	
	Range	Mean $\pm$ SD	Range	Mean $\pm$ SD
<i>Male (M)=297</i>				
Vysya	128.00-241.00	170.02 $\pm$ 27.93	62.00-620	180.02 $\pm$ 129.89
Brahmin	118.00-291.00	169.79 $\pm$ 33.07	53.00-247.00	136.75 $\pm$ 56.98
Reddy	116.00-303.00	179.79 $\pm$ 39.59	50.00-493.00	155.48 $\pm$ 102.89
Relli	100.00-267.00	192.76 $\pm$ 39.02	75.00-570.00	245.18 $\pm$ 149.19
Jalari	93.00-237.00	155.77 $\pm$ 34.14	39.00-518.00	123.44 $\pm$ 99.27
Vadabalija	123.00-245.00	165.16 $\pm$ 26.42	42.00-327.00	109.08 $\pm$ 57.29
Total	93.00-303.00	172.19 $\pm$ 35.32	39.00-620.00	158.14 $\pm$ 113.00
<i>Female (F)=303</i>				
Vysya	81.00-254.00	166.90 $\pm$ 27.51	54.00-398.00	145.42 $\pm$ 78.56
Brahmin	117.00-227.00	169.44 $\pm$ 36.26	60.00-297.00	126.06 $\pm$ 50.61
Reddy	128.00-275.00	178.31 $\pm$ 37.62	50.00-532.00	118.44 $\pm$ 73.21
Relli	132.00-311.00	195.08 $\pm$ 38.43	66.00-560.00	208.04 $\pm$ 137.15
Jalari	115.00-255.00	181.33 $\pm$ 36.43	50.00-316.00	104.63 $\pm$ 57.95
Vadabalija	122.00-316.00	178.20 $\pm$ 40.84	44.00-290.00	104.63 $\pm$ 48.20
Total	81.00-316.00	178.36 $\pm$ 37.31	44.00-560.00	134.49 $\pm$ 87.50
<i>M and F = 600</i>				
Vysya	81.00-254.00	169.73 $\pm$ 32.20	54.00-620.00	162.72 $\pm$ 108.20
Brahmin	117.00-291.00	168.40 $\pm$ 30.41	53.00-297.00	131.62 $\pm$ 54.02
Reddy	116.00-303.00	179.02 $\pm$ 38.39	50.00-532.00	136.22 $\pm$ 90.18
Relli	100.00-311.00	193.94 $\pm$ 38.54	66.00-570.00	226.24 $\pm$ 143.67
Jalari	93.00-255.00	169.06 $\pm$ 37.44	39.00-518.00	113.66 $\pm$ 80.61
Vadabalija	122.00-316.00	171.68 $\pm$ 34.85	42.00-327.00	106.72 $\pm$ 52.73
Total	81.00-316	175.31 $\pm$ 36.44	39.00-620.00	146.20 $\pm$ 101.54

in all.

According to previous studies among survivors of myocardial infarction (54 patients) in Andhra Pradesh (Malini, 1998), the mean TC and Tg concentrations are 181.34 ± 42.60 & 214.60 ± 39.80 while lipoprotein concentrations are 25.20 ± 5.90 ; 114.37 ± 44.30 ; 42.96 ± 7.87 respectively while 15 studies on survivors of myocardial infarctions in the west showed that mean lipid concentrations are 270 mg/ dl (TC) and 160 mg/dl (Tg). It is observed from these results that Indians develop ischemic heart diseases at low concentration of lipids and lipoproteins than the west (Table 3, 4).

DISCUSSION

The control and prevention of high lipid levels are central to the prevention of stroke, coronary heart diseases, cardiovascular diseases and other lipid associated health hazards. Lipidemia is usually symptomless and remain undiagnosed unless it is tested for. One way of detecting lipidemia is conducting health surveys of populations. The determinants of lipids have been

thoroughly explained in western populations. A great number of cross sectional studies of lipid variation in different populations through out the world have been carried out to corroborate the relationship between lipids and bioenvironmental factors. Based on scientific and clinical data from population studies the United States and United Kingdom have established education programmes like National Cholesterol Education Program, (NCEP) Multiple Risk Factor Intervention Trial (MRFIT), Helsinki Heart Study and International Study Group of the European Atherosclerosis study. All these education programmes have brought marked decline in the mortality rates from disease such as coronary heart diseases; cardio vascular heart diseases, and stroke attributable to lipids and signify the application of research and science to public policy.

In India, systematic epidemiological studies of lipid profiles among populations are limited. It is important to know the concentrations of lipids in Indian populations in order to estimate the number of persons who need detection, treatment and to formulate intervention programs by the

Table 2: Range and mean values of lipoproteins among Andhra Populations

Population	Lipoproteins mg/dl					
	HDL		LDL		VLDL	
	Range	Mean $\pm$ SD	Range	Mean $\pm$ SD	Range	Mean $\pm$ SD
Male (M)=297						
Vysya	28.00-48.00	39.42 $\pm$ 4.85	34.00-221.00	98.02 $\pm$ 30.10	12.00-124.00	35.62 $\pm$ 26.00
Brahmin	21.00-52.00	38.04 $\pm$ 6.05	62.00-214.00	104.06 $\pm$ 26.26	10.00-49.00	26.83 $\pm$ 11.36
Reddy	20.00-56.00	39.96 $\pm$ 8.37	54.00-214.00	110.75 $\pm$ 28.77	8.00-99.00	30.42 $\pm$ 20.95
Relli	18.00-50.00	31.49 $\pm$ 7.61	33.00-196.00	113.43 $\pm$ 38.29	15.00-114.00	49.69 $\pm$ 31.27
Jalari	26.00-53.00	38.69 $\pm$ 6.46	52.00-196.00	93.42 $\pm$ 21.89	7.00-85.00	23.54 $\pm$ 18.44
Vadabalija	30.00-51.00	40.82 $\pm$ 5.32	69.00-178.00	102.86 $\pm$ 22.55	8.00-65.00	21.42 $\pm$ 11.44
Total	18.00-56.00	38.07 $\pm$ 7.17	33.00-221.00	103.75 $\pm$ 29.06	7.00-124.00	31.22 $\pm$ 22.96
Female (F)=303						
Vysya	26.00-49.00	39.74 $\pm$ 5.09	54.00-183.00	100.69 $\pm$ 19.95	10.00-105.00	24.85 $\pm$ 10.06
Brahmin	20.00-61.00	39.75 $\pm$ 7.44	58.00-152.00	102.90 $\pm$ 30.68	12.00-59.00	24.79 $\pm$ 10.07
Reddy	28.00-56.00	42.62 $\pm$ 6.05	62.00-200.00	112.79 $\pm$ 28.66	9.00-120.00	21.88 $\pm$ 8.71
Relli	18.00-50.00	34.29 $\pm$ 7.80	35.00-231.00	115.12 $\pm$ 40.02	13.00-114.00	40.35 $\pm$ 27.10
Jalari	30.00-60.00	43.75 $\pm$ 6.67	73.00-177.00	116.75 $\pm$ 27.17	8.00-63.00	20.56 $\pm$ 11.64
Vadabalija	29.00-52.00	42.10 $\pm$ 5.43	72.00-238.00	116.68 $\pm$ 33.40	8.00-58.00	20.48 $\pm$ 9.50
Total	18.00-61.00	40.23 $\pm$ 7.11	35.00-238.00	110.95 $\pm$ 31.09	8.00-120.00	26.42 $\pm$ 17.24
M and F=600						
Vysya	26.00-49.00	39.58 $\pm$ 4.95	34.00-221.00	100.46 $\pm$ 30.34	10.00-124.00	33.03 $\pm$ 22.80
Brahmin	20.00-61.00	38.86 $\pm$ 6.77	58.00-214.00	102.44 $\pm$ 23.39	10.00-59.00	25.88 $\pm$ 10.75
Reddy	20.00-56.00	41.34 $\pm$ 7.34	54.00-214.00	111.81 $\pm$ 28.58	8.00-120.00	25.98 $\pm$ 16.31
Relli	18.00-50.00	32.92 $\pm$ 7.79	33.00-231.00	114.29 $\pm$ 38.99	13.00-114.00	44.93 $\pm$ 29.45
Jalari	26.00-60.00	41.32 $\pm$ 7.01	52.00-177.00	105.55 $\pm$ 27.29	7.00-85.00	21.99 $\pm$ 15.28
Vadabalija	29.00-52.00	40.96 $\pm$ 5.35	69.00-238.00	109.77 $\pm$ 29.19	8.00-65.00	20.95 $\pm$ 10.48
Total	18.00-61.00	39.16 $\pm$ 7.22	33.00-238.00	107.39 $\pm$ 30.29	7.00-124.00	28.80 $\pm$ 20.40

Table 3: Distribution of lipid and lipoproteins in ischemic heart disease patients and controls in Andhra Pradesh

Disease Status	Lipoproteins(mg/dl)			Lipids (mg/dl)	
	HDL	LDL	VLDL	TC	Tg
	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD
Acute Myocardial Infarction (N = 51)	22.64 $\pm$ 5.55	128.90 $\pm$ 68.14	40.96 $\pm$ 13.85	192.90 $\pm$ 59.90	205.03 $\pm$ 68.60
Angina Pectoris (N = 34)	26.00 $\pm$ 5.80	133.50 $\pm$ 54.20	46.50 $\pm$ 9.24	200.05 $\pm$ 53.80	233.86 $\pm$ 46.90
Myocardial Infarction (N = 30)	25.20 $\pm$ 5.90	114.37 $\pm$ 44.30	42.96 $\pm$ 7.87	181.34 $\pm$ 42.60	214.60 $\pm$ 39.80
Controls (N = 38)	34.64 $\pm$ 9.90	107.18 $\pm$ 30.10	25.34 $\pm$ 9.30	166.98 $\pm$ 34.40	128.50 $\pm$ 45.40

Table 4: Distribution of cholesterol and triglycendes among myocardial infarction survivors in the West

Number of Myocardial Infarction Survivors and age range (yrs)	Normal cholesterol (mg/dl)	Normal triglycerides (mg/dl)
50 (46M 4F) < 40	270	160
60 (58 M 2F) < 55	308	160
240 - < 40	280	200
17 - < 40	250	190
83 - < 30-50	260	145
500 -(401M 99F)	285	165
229 229M <27-55	280-300	180
24 (24M) < 23-49	210	150

Source: Berwick, M. Donald et al. (1980)

government. And, there is need for the detection of risk factors of several health problems and to develop and evaluate the low cost methods of effective treatment in India. Many researchers emphasized that in India there is a need to organise a community based program for identifying individuals with elevated lipids and bring them into medical facilities for further evaluation and maintaining a high proportion of them in a long term control program. To diagnose coronary heart disease, we depend on standards which are based on American and European populations. So, there is need to develop standards in India because of unique genetic background of Indian populations.

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KEYWORDS Lipids. Lipoproteins. Mortality. Andhra Populations

ABSTRACT The present study reports Lipid (total cholesterol and triglycerides) and Lipoprotein (HDL, LDL, VLDL) concentrations among six Andhra populations and discussed importance of population surveys covering normal healthy individuals for developing policies for coronary heart diseases (CHD) prevention owing to unique genetic make-up of Indian populations.

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