

Blood Lipid Patterns in Karachi

Pages with reference to book, From 164 To 171

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Abstract

The concentration and distribution of the serum total lipids, serum cholesterol and serum triglycerides were determined in 386 apparently healthy individuals (228 males and 158 females) of Karachi. The dietary analysis revealed that 67% individuals were consuming hydrogenated fat (Dalda Ghee), 31% both dalda and oil and only 2% were using oil alone. The calories taken from fat was found to be 36% in both sexes.

A significant ($t=2.77$) positive correlation coefficient ($r=0.7$) was observed between dietary intake of fat and serum total lipids in males while in females it did not correlate well ($r=0.2$) and the results were insignificant ($t = 0.57$).

Lipids increased with age reaching maximum at the age of 30-93 years in males and 50 years and above in females when they had higher mean lipids than males.

Fourteen percent of males had hyperlipidemia, 11.5% had hypercholesterolaemia and 12.5% hypertriglyceridemia and in females 7% had hyperlipidemia, 5% had hypercholesterolaemia and 7.6% hypertriglyceridemia respectively (JPMA 31:164, 1981).

Introduction

The significance of fat in the diet is not only because it is a rich source of calories but as a carrier of fat soluble vitamins and its role in maintaining healthy skin (Burr and Burr, 1929; Hansen and Burr, 1946; Ahrens et al., 1954 and 1957). Dietary fat especially saturated fat is associated with lipid metabolism (Keys 1956; Walker and Arvidsson, 1954; Brock and Bronte-Stewart, 1955) and is considered to be one of the most important risk factors in the development of coronary atherosclerosis by increasing blood lipids (Keys, 1970). The age and sex influence the levels of serum lipids (Keys, 1950; McMahan et al., 1951; Adlerberg et al., 1956; Lewis et al., 1957). Wide variations in serum lipid levels have been observed in various population groups due to geographical differences, cultural and socioeconomic conditions and dietary habits (Lewis et al., 1957; Schaefer, 1964). In Pakistan, several studies were conducted on serum lipids in healthy adults, patients with coronary heart disease, and members of various communities (Beg et al., 1970; PMRC Monograph, 1976). Available data reveal that nearly 20% of the patients with coronary heart disease belonged to the younger age group (25-44 years). The present study is concerned with the blood lipid pattern, its distribution and its correlation with dietary fat intake in a representative sample of general population of various ages, sex and socioeconomic groups residing in Karachi.

Material and Methods

Three hundred and eighty-six apparently healthy individuals (228 males and 158 females) were selected by random methods. The criteria used for selection were anthropometric measurements and the nutritional status according to the standard of National Health Laboratories (1972).

Dietary intake of uncooked foods for 1 week recorded and analysed by the food composition table designed by Pallett and Shadarevian (1970). Five millilitres blood was drawn from these individuals and analysed for serum total lipid (Kunkel et al., 1948), serum cholesterol (Ferro and Ham, 1960) and

triglycerides (Sigma Bulletin 104).

Results

Dietary Analysis

Dietary analysis revealed that 67% of subjects were taking only saturated fat (Dalda Ghee), 31% consumed both Dalda and oil and only 2% were using only oil (unsaturated fat).

Table 1

Nutrient Intake of Apparently Healthy Males of Various Age Groups (Per Person/Day) in Grams

<i>S. No.</i>	<i>Age in years</i>	<i>Total amount of food intake Grams</i>	<i>Calories</i>	<i>Protein Grams</i>	<i>Animal Protein</i>	<i>Fat Grams</i>
1.	0—1	—	—	—	—	—
2.	1—3	538.0	1050.0	29.8	11.3	34.0
3.	4—6	547.4	1589.7	45.6	10.7	46.6
4.	7—9	586.8	1660.8	47.8	11.1	44.1
5.	10—12	583.2	1827.9	47.0	9.2	44.3
6.	13—15	628.8	1850.6	49.5	10.5	47.5
7.	16—19	870.5	2283.0	64.0	15.2	72.2
8.	20—29	839.6	2316.4	64.3	16.0	65.4
9.	30—39	960.5	2471.7	68.1	17.4	68.4
10.	40—49	831.8	2204.0	54.6	14.4	65.7
11.	50+	704.4	2119.7	57.8	14.75	70.5

Table II

Nutrient Intake of Apparently Healthy Females of Various Age Groups (Per Person/day) in Grams

<i>S No.</i>	<i>Age in years</i>	<i>Total amount of food intake grams</i>	<i>Calories</i>	<i>Protein grams</i>	<i>Animal protein</i>	<i>Fat grams</i>
1.	0—1	—	—	—	—	—
2.	1—3	452.0	1068	29.0	11.7	29.5
3.	4—6	563.0	1528	40.0	9.4	42.2
4.	7—9	552.7	1552	43.1	7.8	45.8
5.	10—12	611.6	1740	48.3	9.8	49.5
6.	13—15	657.7	1902	51.7	9.8	49.0
7.	16—19	810.7	2058	59.2	11.6	52.2
8.	20—29	859.0	2288	59.8	14.5	51.4
9.	30—39	858.9	2248	59.4	15.0	70.8
10.	40—49	696.3	2026	55.5	11.3	65.1
11.	50—	725.3	2018	52.8	12.0	68.3

Table I (males) and Table II (females) show the major nutrient intake per person per day. Generally low caloric and animal protein intake was observed in all age groups especially in children under 15 years of age, fat intake was found to be satisfactory in all age groups. Maximum nutrient intake was observed between 30-39 years of age in both sexes. The percentage distribution of the total caloric intake was 63% from carbohydrate, 11% from protein and 26% from fat.

A positive correlation ($r=0.7$) was observed between daily dietary intake of fat and serum total lipids in males and result was found to be statistically significant ($t=2.77$) while in females it did not correlate well ($r=0.2$) and results were insignificant ($t=0.57$).

Biochemical investigation**Serum total lipids:**

Mean values of serum total lipids were within normal limits in both sexes. They ranged from 419-794 mg% in males and 344.8-694 mg% in females (Table III).

Table III

Mean Serum Total Lipids Levels in Apparently Healthy Males,
Females of Various Age Groups

Group Nos.	Age in years	Total Nos. M	Total Nos. F	Total Lipids ± S.E. (Normal Range 400-800 mg%) M	Total Lipids ± S.E. (Normal Range 400-800 mg%) F	Ranges M	Observed F
1.	0—1	5	4	431.4 ± 68.78	437.80 ± 67.8	375—492	315—449
2.	1—3	13	14	443.7 ± 18.69	443.40 ± 17.18	350—549	350—566
3.	4—6	11	13	419.26 ± 19.70	344.84 ± 9.89	315—585	302—415
4.	7—9	15	15	589.6 ± 28.76	401.00 ± 16.65	499—798	306—507
5.	10—12	32	13	649.4 ± 33.1	564.34 ± 24.94	402—1337	417—418
6.	13—15	10	10	665.35 ± 55.01	609.76 ± 52.13	516—1030	350—914
7.	16—19	22	13	595.9 ± 19.85	632.53 ± 37.60	384—957	400—815
8.	20—29	46	34	705.39 ± 35.30	639.89 ± 25.45	385—1297	415—1014
9.	30—39	25	24	793.85 ± 48.94	650.56 ± 33.06	385—1297	415—1014
10.	40—49	18	8	766.38 ± 52.29	630.55 ± 32.83	511—1500	466—775
11.	50+	15	10	742.86 ± 58.37	694.14 ± 42.58	449—1065	515—963

The mean lipids values increased with age, reaching maximum at the age of 30-39 years in males and then declined. In females the maximum values were obtained at the age of 50 years and above. Males had higher lipid values than females but at the age of 50 and above, the means values of lipids were higher in females and ran parallel to their male counterparts (Fig. 1).

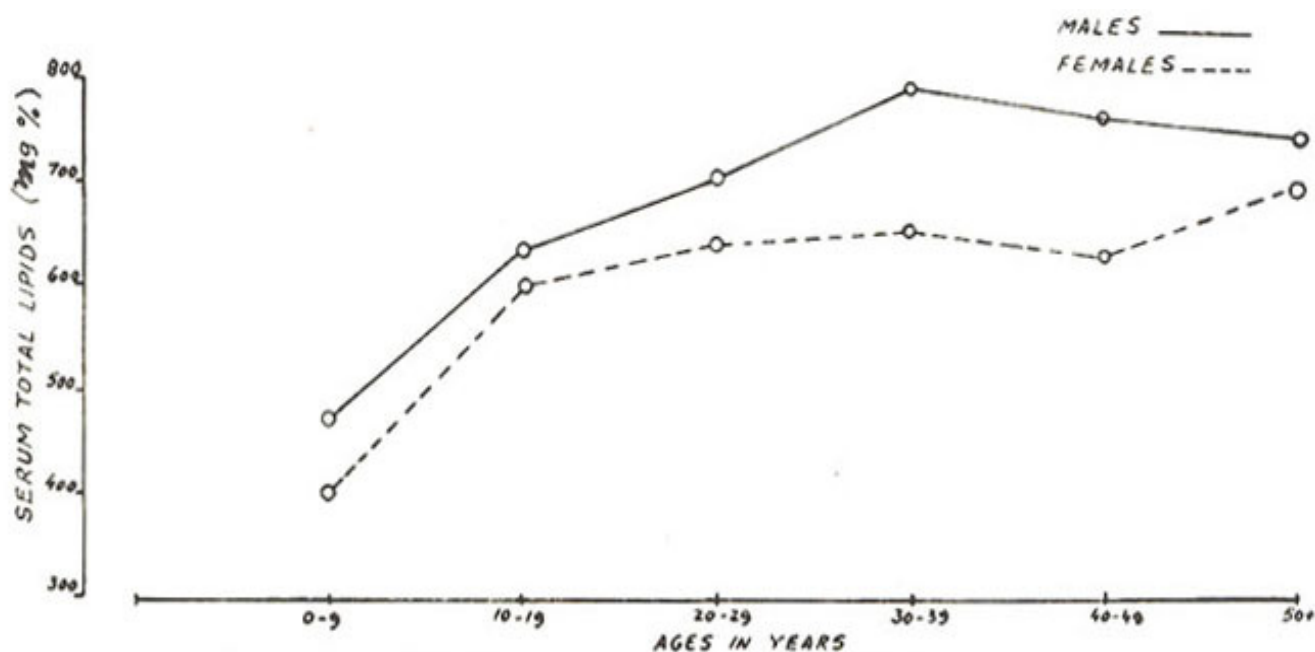


Fig. 1 Mean Serum Total Lipids of Apparently Healthy Males and Females of Various age Groups.

The frequency distribution curves have shown similar patterns of lipids in both sexes. The majority of subjects had total lipid values between 400-800 mg%, the peak was observed at the level of 500 mg%. Values were higher in males than females (Fig. 2).

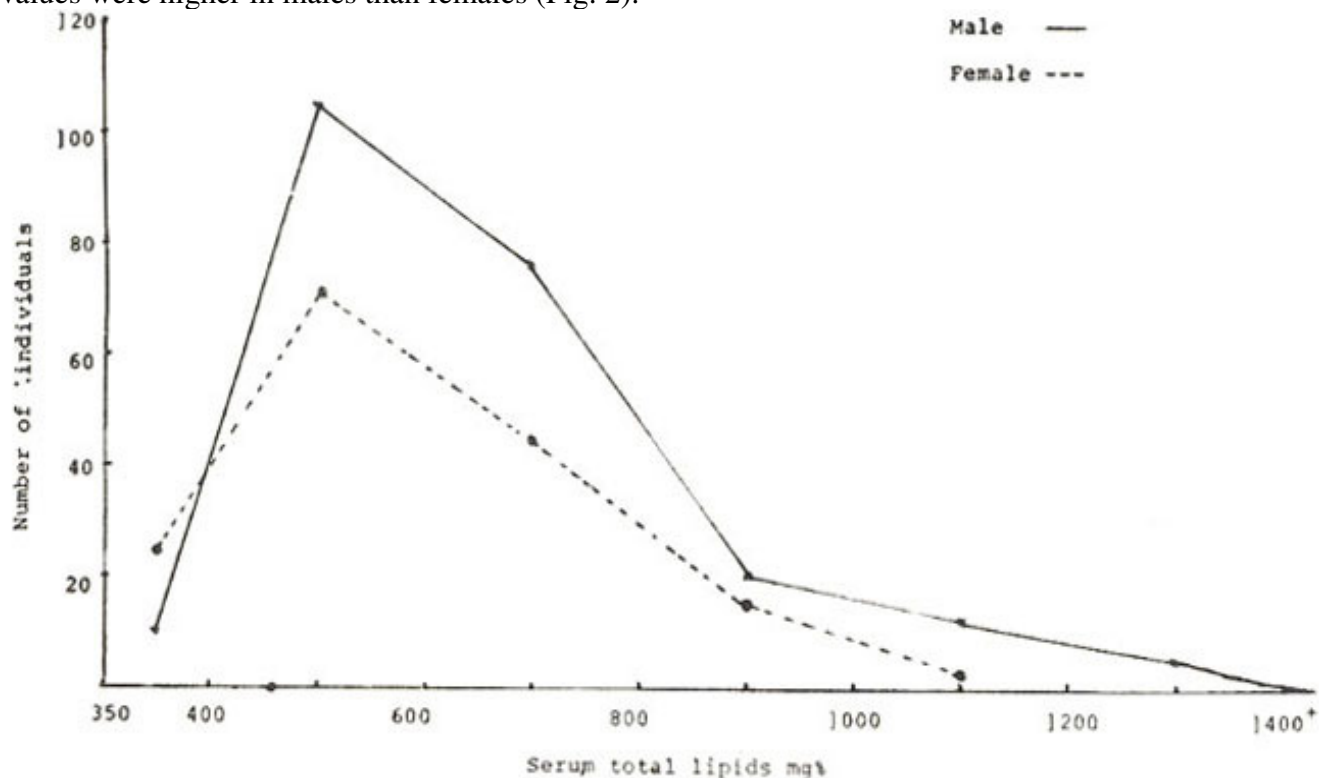


Fig. 2 Frequency distribution of serum total lipids in apparently healthy males and females of various age groups.

Hyperlipidaemia was observed in 14% males and 7% females.

2. Serum cholesterol:

The range of serum cholesterol varied from 128-242.8 mg% in males and 125-239.9 mg% in females (Table IV).

Table IV

Mean Serum Cholesterol Levels in Apparently Healthy Males and Females of Various Age Groups

Group Nos.	Age in years	Total Nos.		Cholesterol $\pm$ S.E. (Normal Range 150-250 mg%)		Cholesterol $\pm$ S.E. (Normal Range 150-250 mg%)		Ranges observed	
		M	F	M		F		M	F
1.	0-1	5	4	128.2 $\pm$ 4.24		125.00 $\pm$ 5.00		120-140	120-135
2.	1-3	13	14	149.9 $\pm$ 10.61		138.10 $\pm$ 6.45		102-220	92-190
3.	4-6	11	13	166.09 $\pm$ 10.32		156.23 $\pm$ 6.25		133-258	120-213
4.	7-9	40	15	154.00 $\pm$ 5.356		168.50 $\pm$ 5.18		116-235	122-205
5.	10-12	32	13	163.00 $\pm$ 5.05		174.46 $\pm$ 10.29		122-270	141-285
6.	13-15	10	10	175.00 $\pm$ 7.425		190.13 $\pm$ 9.30		105-220	135-250
7.	16-19	22	13	202.85 $\pm$ 6.39		199.27 $\pm$ 7.88		130-280	130-280
8.	20-29	48	34	204.30 $\pm$ 5.56		206.64 $\pm$ 5.76		132-265	145-268
9.	30-39	25	24	242.88 $\pm$ 8.113		209.31 $\pm$ 7.85		146-320	130-320
10.	20-49	18	8	233.00 $\pm$ 5.81		206.13 $\pm$ 15.81		185-280	164-300
11.	50-	15	10	229.45 $\pm$ 11.47		239.90 $\pm$ 13.82		150-285	160-280

Serum cholesterol levels also increased with the advancement of age. Maximum values were obtained in males between 30-39 years of age then gradually declined. In females maximum values were obtained at the age of 50 and above. Cholesterol levels were slightly higher in females than in males upto the age of 29 years then upto the age of 50 years males had higher values but beyond the age of 50 levels were higher in females than in males (Fig. 3).

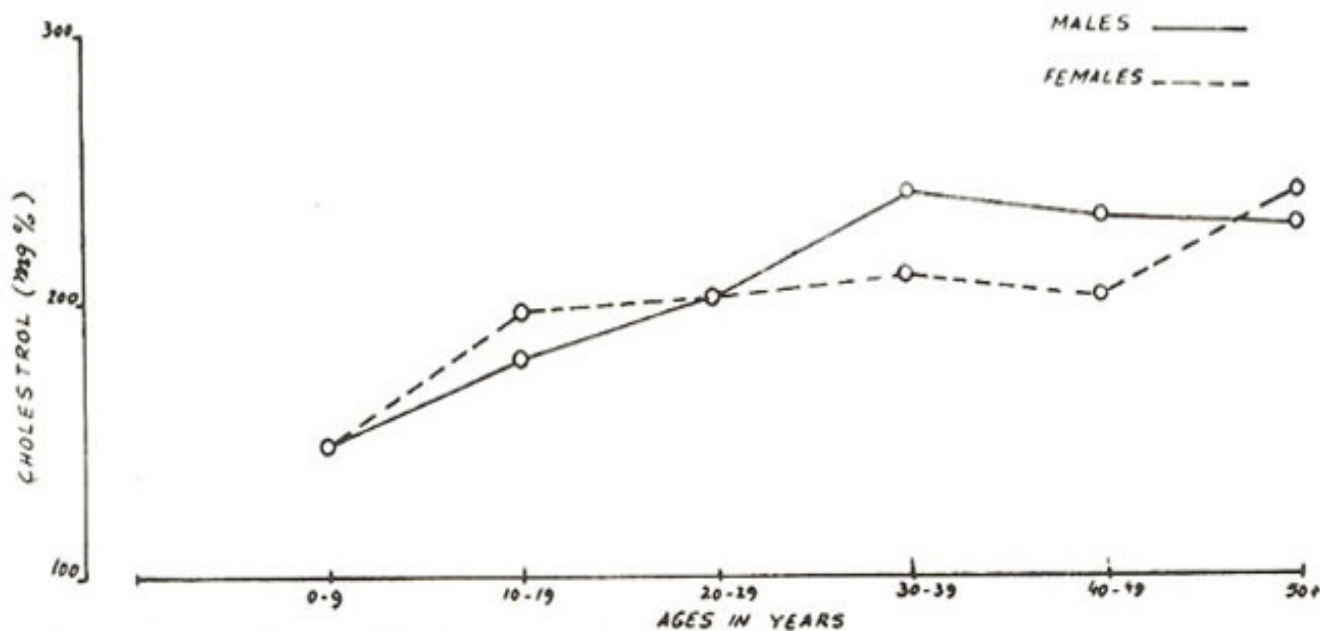


Fig. 3 Mean Serum Cholestrol of Apparently Healthy Males and Females of Various age groups.

The frequency distribution curves have shown similar pattern in both sexes. Most of the subjects had cholesterol levels ranging between 100-250 mg% and the peak was observed between 150-200 mg%. Hypercholesterolaemia was found in 11.5 males and in 5% females (Fig. 4).

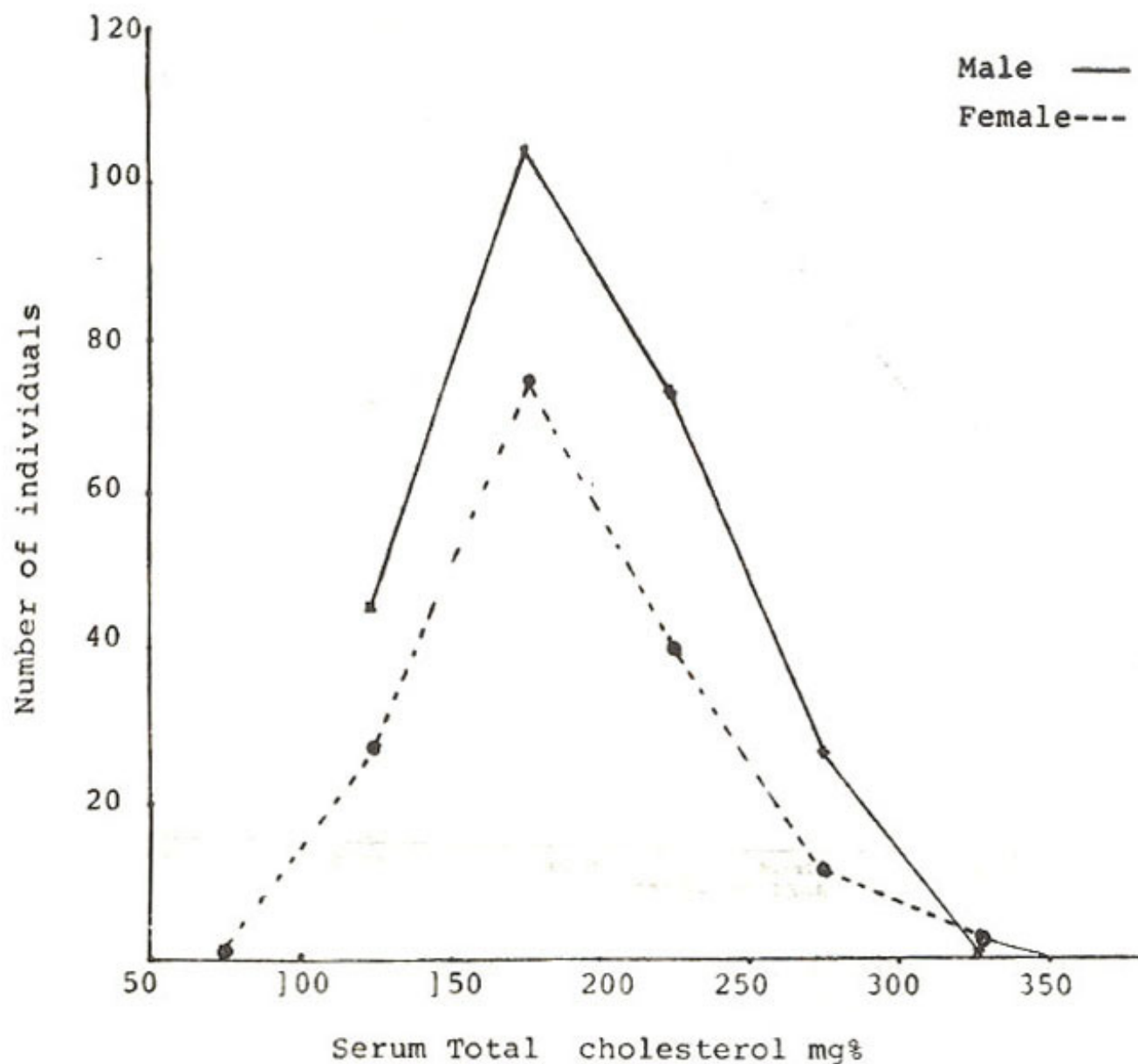


Fig. 4 Frequency distribution of serum cholesterol in apparently healthy males and females of various age groups.

3. Serum Triglycerides

The mean serum triglycerides were found to be within normal limits in both sexes and the range was from 10.2 to 160 mg% in males and 13.3-154 mg% in females (Table V).

Table V

Mean Serum Triglycerides Levels in Apparently Healthy Males and Females of Various Age Groups

Groups Nos.	Age in years	Total Nos.		Triglycerides $\pm$ S.E. (Normal Range 10-190 mg%)		Triglycerides $\pm$ S.E. (Normal Range 10-190 mg%)		Ranges	
		M	F	M		F		M	F
1.	0—1	5	4	32.5 $\pm$ 1.06		18.6 $\pm$ 1.16		7.5—60	6.5—10.5
2.	1—3	13	14	22.88 $\pm$ 2.10		21.4 $\pm$ 2.07		12 —38	5—38
3.	4—6	11	13	10.27 $\pm$ 3.28		13.28 $\pm$ 0.98		5—16	7—19
4.	7—9	15	15	20.6 $\pm$ 5.356		14.23 $\pm$ 2.00		5—40	2—35
5.	10—12	32	13	41.1 $\pm$ 4.75		33.81 $\pm$ 3.62		18.5—140	10—45.9
6.	13—15	10	10	86.75 $\pm$ 12.93		64.42 $\pm$ 14.66		23 —170	30—170
7.	16—19	22	13	82.27 $\pm$ 10.77		90.15 $\pm$ 14.42		10 —205	39—195
8.	20—29	33	34	110.44 $\pm$ 8.16		116.95 $\pm$ 0.40		42.6—300	44—320
9.	30—39	25	28	160 $\pm$ 4.4	14.97	135.556 $\pm$ 12.32		90 —325	60—337
10.	40—49	18	8	152.7 $\pm$ 11.07		725.25 $\pm$ 14.96		87 —250	55—175
11.	50—	15	10	140.06 $\pm$ 11.46		154.00 $\pm$ 14.46		76 —220	81—244

The mean values of triglycerides sharply increased with the age reaching maximum in 30-39 years of age in males and then gradual decline was observed. In females the optimal values were seen at the age of 50 and above. Males had higher values than females but again at the age of 50 and above females had higher values than males (Fig. 5).

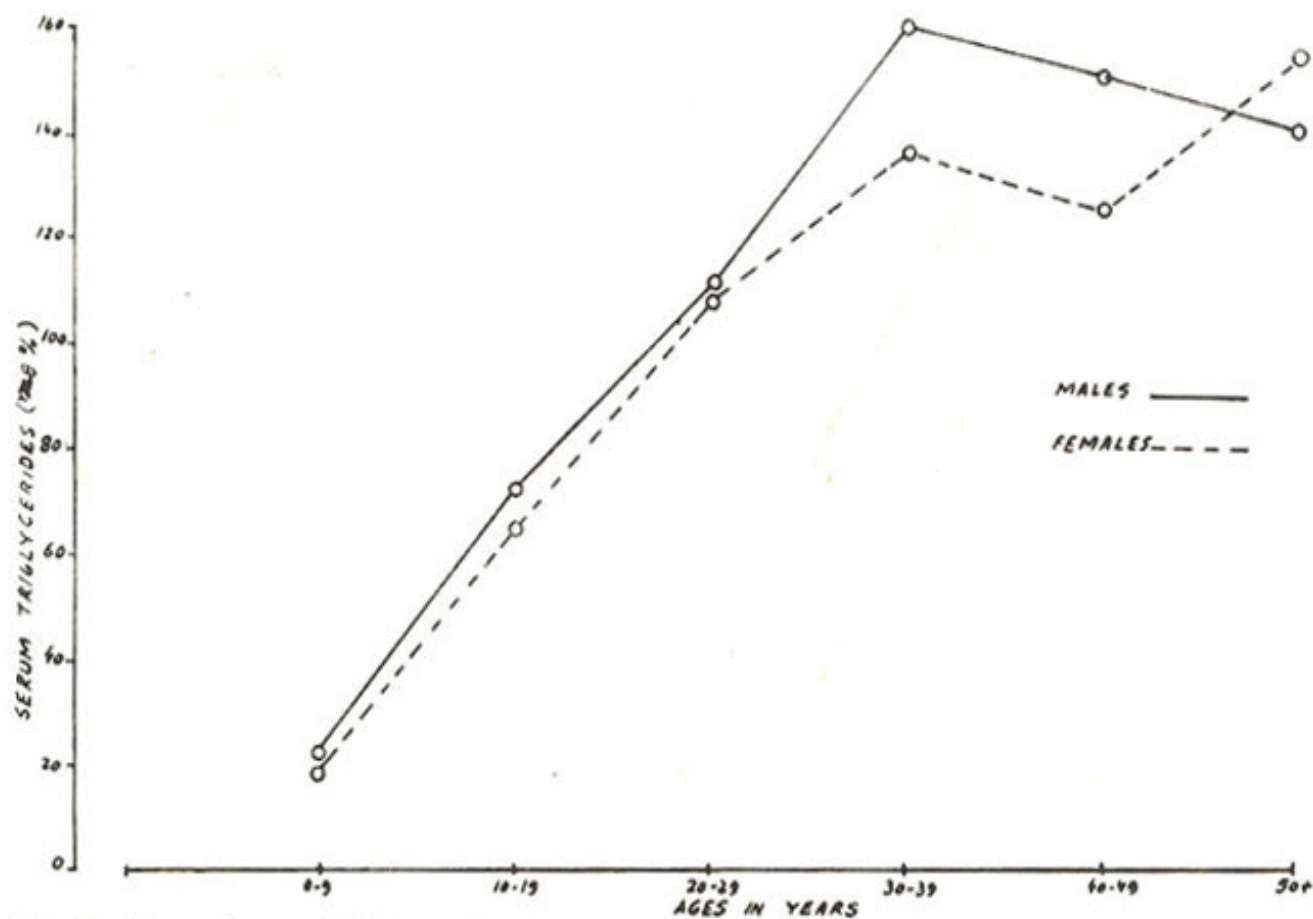


Fig. 5 Mean Serum Triglycerides in apparently Health Males and Females of various age groups.

Similar pattern of distribution of triglycerides was observed in males and in the females. Two peaks were obtained. One shows the maximum number of young individuals between the range of 0-40 mg% and second indicate that maximum numbers of older adults were between 60-180 mg% (Fig. 6).

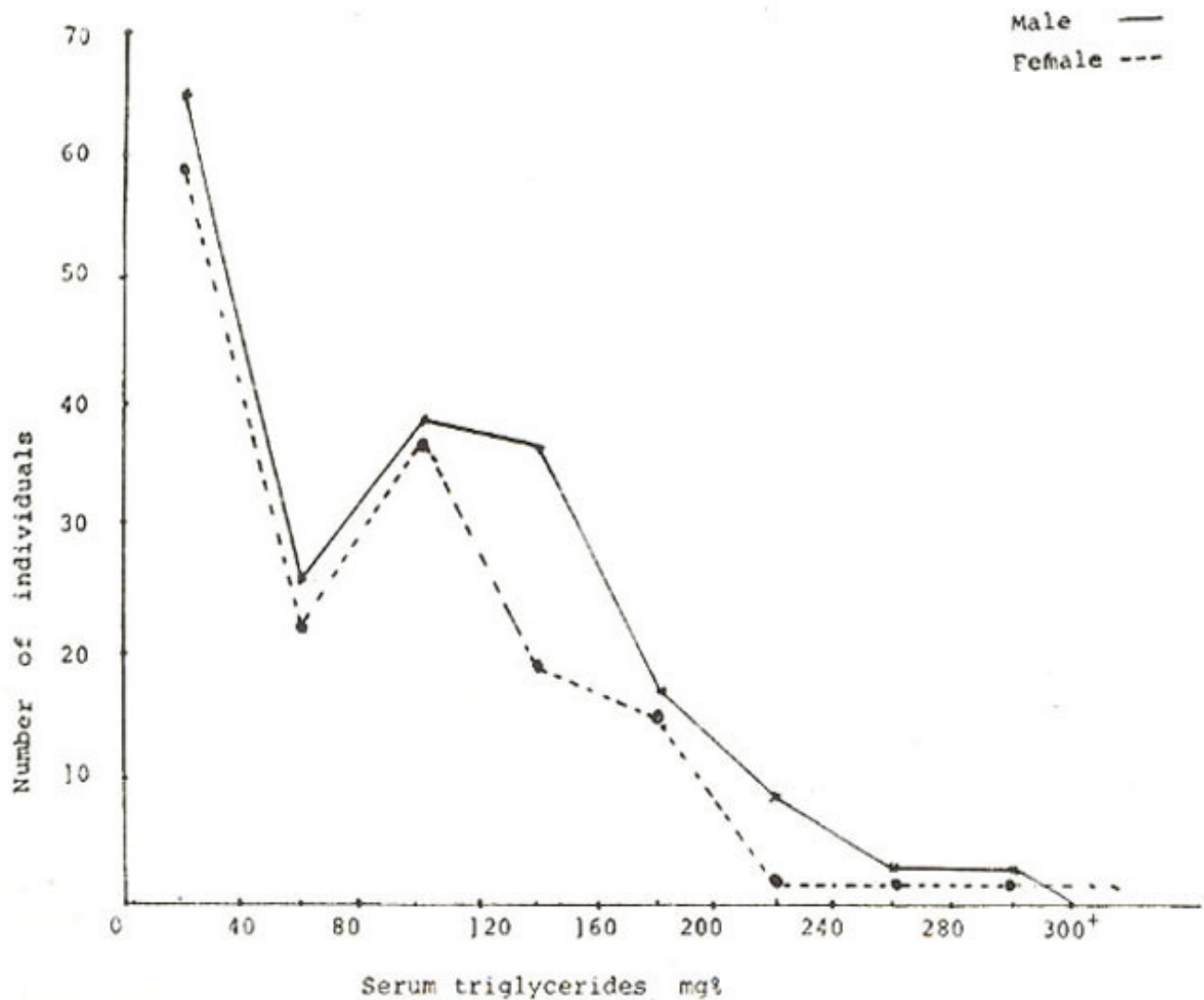


Fig. 6 Frequency distribution of serum triglycerides in apparently healthy males and females of various age groups.

Hypertriglyceridaemia was observed in 12.5% males and 7.6% females.

Discussion

Variations in serum lipids levels have been observed in healthy adults and in children as has previously been reported in other populations (Lewis et al., 1957; Schaefer, 1964). These differences may be related to dietary fat intake and the quality of fat associated with various environmental factors.

Mean values of serum total lipids, cholesterol and triglycerides were determined which are specific for this population. Mean values were found to be within normal range but were comparatively lower than Americans (Schaefer, 1964), similar to Italians, Nigerians and Guatemalians (Keys et al., 1952; Keys et al., 1964; Mann et al., 1955; Monn et al., 1955). This may be due to low caloric intake from fat (20-26%) in these countries as compared to Americans where 35-40% calories come from fat.

Skewed distribution curves observed by others were also obtained in this study (Lewis et al., 1957; Schaefer, 1964). Although the majority of the subjects had normal serum lipids but, in some, higher values were observed. The cumulative frequency curves of lipids are very useful as they help in

assessing the serum values in a particular individual with reference levels to the general population. The present study showed that lipid pattern as well as the utilization of fat in women is different from man, the results are similar to those observed in other populations (Lewis et al., 1957; Schaefer, 1964). The changes in lipid pattern of females may probably be influenced by changes in the hormonal balance in premenopausal, menopausal and post menopausal periods (Adlerberg Keys, A. Diet and coronary heart disease, in *cardio vascular Epidemiology*, Edited by A. Keys and P.D. White. New York, Hoeber-Harper, 1956, p.135 et al., 1956; Russ et al., 1951). The results of this study indicate that the serum lipids concentration in females of child bearing age were lower than males but after menopause the females had higher lipid levels than males. Thus males are more prone to coronary disease at an earlier age (30-39 years) and females at the age of 50 years and above. The difference in the frequency of coronary heart disease between males and females can also be explained by the lesser frequency of hyperlipidemia in women. As the quantity as well as the quality of fat has a definite effect on the levels of lipids (Keys, 1970), the consumption of unsaturated fat instead of saturated fat would be suggested for the control of hypenipidaemia.

Refereces

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