Plasma Lipid Profile of Healthy Saudi Population in Makkah Region

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Five Hundred healthy Saudi subjects aged 18-80 years (48.65 + SEM) (400 males and 100 females) were randomly included in this pilot study from Makkah area for the estimation of plasma lipids. Thes subjects were subclassified into four age groups with a gap of 15 years. The sample included representative groups of University students, office and executive workers, Religious leaders and the general population. Standard exclusion criteria were laid down. Blood sugar, S. createnine, urea, S.bilirubin, SGOT and SGPT were also estimated along with the lipid profile in the fasting state. The mean total cholesterol (TC) and triglycerides (TG) were 191 mg/dl + 2.15 SEM and 172 mg/dl + 6.125 SEM respectively. The mean high density lipoprotein (HDL cholesterol) was 41.5 mg/dl being higher in the younger age group. The study revealed that 28% of the subjects had Total Cholesterol ≥ 210 mg/dl (5.4 mmol/L), 16% had HDL cholesterol < 35 mg/dl (0.9 mmol/L) and 35% were active smokers.

Introduction

Coronary Heart Disease (CHD) once a major health problem of the West is rapidly becoming a challenge to the East as well. Affluent societies like Saudi Arabia where the phical activity is rather a t the lowe edge has all the potentials of allowing this complex pathology to raise the mortality and morbidity statistics. Several prospective studies have shown that Blood Cholesterol is a strong predictor of heart disease particularly in young adult males.[1] To the best of our knowledge no study of the prevalence of CHD in Saudi Arabia has been carried so far. Hyperlipaedemia as one of the major risk factors for CHD can be monitored and intervened. It is an established fact now that the lowering of TC. and LDL. cna reduce the rate of progression of atherosclerosis and CHD.[2]

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Several epidemiological studies had also concluded a strong inverse relationship between CHD AND HDL cholesterol. (3,4). The distribution of HDL cholesterol varies with age, race, sex, physical activity and education. [5,6,7] Females are said to having higher levels of HDL than males and in blacks it is more than the whites. [8] Whereas HDL is considere as the good choleterol, LDL cholesterol if higer is a bad omen [9,10] and low density lipoprotein (LDL) cholesterol is found to be a strong predictor of coronary risk in men below 50 years of age.

High density lipoprotein (HDL) and its main subfractions HDL 1,HDL 2 & HDL 3 are said to be influenced by smoking, D.M., alcohol consumption and thyroid disease. [12]

Various small scale studies have been conducted to establish a base line

normality profile of lipids in Saudi Arabia.(13,14) No such study is known to have been carried out for Makkah area. In this study such an effort is being aimed. Along with the determination of lipid profile, total cholesterol (TC) triglycerides, HDL cholesterol and LDL cholesterol in randomly selected males and females healthy Saudi subjects in the Holy land of Makkah area, certain other interrelated anthropometric parameters (age, height, weight and body mass index) smoking and systolic and diastolic blood pressure were also recorded.

Material and Methods:

Among the healthy adult Saudi residents of Makkah area a randomized stratified cluster sample of 500 subjects (Male to Female and urban to rural ratio 4:1) was studied. The sample was carefully designed to include representative groups of university students, office and executive workers, rural and urban sections, religious leader and the general population. By age the study population was divided into four groups with 15 years gaps (range 18-80 years). For each category of sample an excess of 10% subjects were listed to cover the exclusion criteria. Each subject was informed about the study procedures and consent was obtained. The exclusion criteria which were based on history, clinical or laboratory observations consisted of subjects with CHD, DM, pregnancy, renal failure, thyroid disease, pancreatitis,obesity ,hypertension, chronic delilitating diseases those on lipid lowering drugs.

Two teams each comprising an experienced physician, a male or female nurse and laboratory technician were deputed to examine and collect the samples. Each subject was interviewed for completing the prescribed proforma and examined physically; including height , weight & blood pressure either at his working place or at the primary health centres. Teams were also sent to the nearby villages to obtain the blood samples and physical check up of the rural subjects. All the blood samples were collected from the participants in the fasting state for at least 12 hours. Either serum or plasma were used for analysis of TC, HDL,TG,Glucose, S. bilirubin, SGOT, SGPT, urea and createnine which were estimated by using Kodak Ektachen 700 XR according to the standard assay technique. LDL was calculated by Friedwald formula. [15]

Statistical Analysis:

Statistical analysis of the data was done manually through the precoded closed proforma. Student "t/test was used. The result were expressed as means $\pm$ SEM.

Results

TABLE I - shows the different physical characteristics of the subjects. The groups were divided according to the age from18-34 group I with 15 years gap in to four groups.

TABLE II - presents mean lipid profile values of total cholesterol, HDL Cholesterol , LDL Cholesterol triglycerides in different age group both in the males and females.

The mean total plasma cholesterol was higher (ref. 200 mg/dl) in the age group 35-50 years and 50-65 years but was lower in both younger and older than 65 years age groups. The average mean plasma cholesterol was 191 mg/dl $\pm$ 2.15 SEM ranging from 156-228 mg/dl. The

HDL cholesterol mean values are 41 mg/dl with slightly higher values in the female but these differences were not significant. The percentage of subjects who had plasma HDL cholesterol < 35 mg/dl, (0.9 mm0l/L was 16%. The mean plasma LDL cholesterol was 115 mg/d ± 1.5. 30% had triglycerides level > 200 mg/dl. (2.26 mm0l/L). The current smokers were 35%.

Discussion

The Internationla Multidisciplinary workshop in 1979 [16] the World Health Organization Committee on Prevention of Coronary Heart Disease, [2] the NIH Consensus Development Conference [17] and the study group of European Atherosclerosis Society [2,16,19] has considered a population mean plasma cholesterol below 200 mg/dl as desirable. The 1st authority also noted that plasma cholesteroal consistently lower than 180 mg/dl slows the process of atherosclerosis and CHD.

The results of study show the mean plasma cholesterol of 191 mg/dl ± 2.15 SEM which is significantly lower than the levels of European males ie (248-271 mg/dl) in Finland, (209-236 mg/dl), in Netherland, (205 to 215 mg/dl) in Spain. Our levels are almost similar to Italy (194-205 mg/dl), Poland [18] (186-197 mg/dl), Pakistan & Philippine [18] (170-197 mg/dl). African males in the countries like Ghana, Nigeria and Ivory Coast have lower plasma level (155-163 mg/dl) [18] than our population study group.

The mean value of high density lipoprotein below 35mg/dl is considered low by International standard (16) and it is associated with enhanced risk of CHD. Our study showed a mean plasma HDL cholesterol 40.5 mg/dl which is comparable with values of HDL in countries like Pakistan, Nigeria, Philippines and Surinaim values [18] (27-42 mg/dl) which are similar with the findings of Connor et al. [19] for Tarahumar Indians (27 mg/dl) and these of Robinson et al. [20] for Maasai men (41 mg/dl) our Triglycerides levels for Saudi Arabian males and females are higher (172 mg/dl) as compaired to Libyan subjects (21) (148 mg/dl) where as the mean plasma LDL levels are (116 mg/dl) also elevated than Libyans (21) (107 mg/dl). 32% of the population sample had Trigylcerides levels ≥ 200 mg/dl (2.26 mmol/L).

Several investigators [13,14] have studied lipid profile pattern in healthy Saudi subjects in different regions of the country. Although the sample volume in our study was small, it may be considered a reflection of the pattern of plasma lipids and lipoprotein in the area and it would encourage other larger studies.

Two studies done by El Hazmi et al. (13) & Harthy et al (14) included 578 (males 352 and females 226) subjects (age range 20-30 years) 326 healthy Saudi (190 males and 136 females) respectively showed plasma total cholesterol ranging 120-235 mg/dl and below 180 mg/dl (range 140-180 mg/dl) respectively.

Our study is compairable to the study done by El Hazmi et al. [13]
Another study recently done by Khoja et al. [22] for Western Region (Jeddah, Makkah, Medina,Taif, Gizan, Abha & Al Baha) for lipid profile including 3616 (2294 males & 1322 females)

Table I

Physical Characteristics of the subjects by age groups (Mean + SEM)

AGE GROUPS

Variables	MALES				FEMALES			
	1	2	3	4	1	2	3	4
NO	128	124	49	36	32	30	12	04
Age M (YRS) R	28.1± 0.2 (18-34)	42.9 ± 0.2 (35-49)	57.1± 0.3 (50-64)	71.4 ± 0.5 (65+ Above)	26.2 ±0.1	43±0.2	53±0.3	67.5±0.2
Weight (kg)	71.8±1.2	77.5±0.79	79±0.5	68.6±1.8	58.2±0.5	65.2±1.2	75.±0.8	75.8±0.2
Height (cm)	166±0.4	165.7±0.4	164.9±0.4	158±0.7	162.5±1.2	164±0.5	158 ±0.8	157±0.4
Body Mass Index	26.1±1.4	28.23+0.7	27.55±1.4	27.55±1.4	22.21±1.3	24.8±0.8	28.6±1.2	29.6+1.5

(M= Mean) (R=Range)

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VARIABLES	MALES				FEMALE			
	1	2	3	4	1	2	3	4
NO	128	124	49	36	32	30	12	04
Total Cholesterol Mg/Dl	183.6+1.4 4.78+0.4 mmol/L	200.6+1.4 5.2+04 mmol/L	194.5+2.1 5.06+.06 mmol/L	185+3.7 4.8+0.9 mmol/L	172.3+2.5 4.48+.09 mmol/L	175.5+1.4 4.5+.04 mmol/L	200.2+1.4 5.2+.04 mmol/L	204.4+3.1 5.30+.81 mmol/L
HDL:mg/dl	42.6+.6 2.90+.02 mmol/L	40.4+.5 3.31+.02 mmol/L	41.5+1.2 1.08+03 mmol/L	41.5+1.2 3.39+08 mmol/L	43+0.3 1.13+007 mmol/L	40.2+.6 1.05+.017 mm0l/L	41.3+8 1.08+.02 mmol/L	42.1+1.3 1.12+.013 mmol/L
Triglycerides: mg/dl	149+2.7 1.66+.07 mmol/L	169+.3 1.88+07 mmol/L	204.3+5.8 2.26+0.15 mmol/L	166.3+1.3 1.84+.34 mmol/L	128+1.5 1.42+.02 mmol/L	170+2.5 1.89+.06 mmol/L	200.3+3.5 2.26+0.8 mmol/L	190+5.6 2.11+1.4 mmol/L

aged 20-60 years in healthy as well as Diabetes & CVD patients showed mean plasmqa cholesterol value of 183 mg/dl which is slightly lower than ours but htis study varies as regards the nature of the disease pattern and the regions. It appeared from our study that 35% of the samples population are active smokers.

There seems to a genuine need for larger study to estimate the incidence of coronary heart disease in Saudi Arabia.

Table 3

Prevelance of CAD Risk Factors in Healthy Saudi Subject

RISK FACTOR	CRITERIA	NO. OF SUBJECTS	PERCENTAGE
TOTAL CHOLESTROL	(210 mg/dl) >5.4 mmol/L	140	28%
HDL	(35 mg/dl < 5.4 mmol/L)	81	16.2%
TRIGLYCERIDES	(200 mg/dl) > 2.26 mmol/L	122	24.5%
CURRENT SMOKERS	----------	175	35%

References

1. Kannel WB,Castell WP,Gordon T et al, Serum Cholesterol Lipoproteins and the risk of coronary heart disease. Ann Int. med. 1971, 74: 1-12

2. World Health Organization expert committee. Prevention of coronary heart disease. WHO technical report series 678, Geneva: WHO (1982)

3. Miller GJ,Miller NE, Plasma high density lipoproteins concentration & development of ischaemic heart disease. Lance 1975: 1:16-19

4. Linns, Fulwood R, Rifkind Bet al. High density liporpotein cholesterol levels among U.S. adults by selected dermographic and socioeconomic variables. Ann J Epidemiol 1989: 129: 281-294

5. Heiss G, Johnson NJ, Reiland S et al. The Epidemiology of plasma high density lipoprotein cholesterol levels: The lipid research clinics program. Prevalence study (summary) circulation 1980: 62 (Suppl IV) 116-136

6. Abbott RD, Garrison RJ, Wilson WF et al. Joint distribution of lipoprotein cholesterol classes: The Framingham

study. Atherosclerosis 1983: 3: 260-272

7. Refkind BM,Tamir I Heiss G et al. Distribution of high density and other lipoproteins in selected LRC prevalence study populations: a brief survery lipids 1979: 14: 105-112

8. Tyroler HA, Glueck CJ, Christensen B et al. Plasma high density lipoprotein cholesterol comparison in black and white populations.
The lipid research clinics programme prevalence study, circulation 1980, 62 (Supp. IV) 99-107

9. Gold Stein JL, Brown MS. Atherosclerosis: The low density lipoprotein receptor hypothesis. Metabolism 1977:26 1257-1275

10. Gold Stein JL, Brown MS. Low density lipoprotein pathways and its relation to atherosclerosis. Ann Rev. Biochem 1978, 46; 897-930

11. Castelli P. Framingham heart study update: Cholesterol, Triglycerides, lipoproteins and the risk of coronary heart disease. Perspect lipid DIS 3: 20, 1986

12. Eder HA, Gidez LI, High density lipoprotein cholesterol HDL2 HDL3 in healthy subjects and in patients with coronary heart disease and with diabetes. In: No-Seda GF Fragiacomo Fumagalli R eds. Lipoproteins and coronary atheroselensis. Amsterdam. EL sevier 1912: 42-46

13. El-Hazmi M.A.F.., AL-Faleh F.Z., AL-Mofleh I.A., Wary A.S., A.K. Establishment of normal (References) ranges from biochemical parameters for healthy Saudi Arabs. Tropical and Geographical Med. (1982) 34: 323-332

14. S.S.A. Harthi, M.M. Al Nozha, S.Subahi, S. Malaika Plasma lipids and lipoproteins pattern among healthy Saudis.

15. Fried Wald WT. Levy RI, Frederickson DS. Estimation of the concentration of low density lipoproteins cholesterol in plasma, without use of preoperative ultra centrifuge. Clin. Chem 1972: 18: 499-502

16. Black H, Lewis B, Wissler RW, Wynder EL. Conference on the health effects of Blood lipids: Optimal distributions for populations, Prev. Med. (1979) 8: 609-759

17. NIH concensus development conference statement lowering blood cholesterol to prevent heart disease. Jama (1985) 253: 2080-2086

18. Kunuiman J, West CE, Burema J. Serum total and high density lipoproteins cholesterol concentrations and body mass index in adult men from 13 countries AMJ, Epidemiol 1982: 116: 631-642

19. Connor WE, Cerqueira MT, Connor RW et al. The plasma lipids lipoproteins and diet of the Tarahumara Indians of Mexico. An J. Elin. Nutr. 1978: 31: 1131-1142 U.S.

20. Robinson D, Williams P, Day J. High density lipoprotein cholesterol in the Maasai of East Africa: a cautionary note.

Br. Med. J. 1979: 1: 1249

21. El- Fakhrim, Ghwarsha K, Sheriff DS. Plasma lipid levels in a Libyan population. Saudi Med. J. 1989: 9: 493- 502

22. S.M. Khoja, A.M. Slem, A.M. Taha, N.AHakim. Plasma lipid levels of a selected Saudi Arabia Population in the Western Region: Saudi Med. J. vol. 14. no. July 1993.