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A Preliminary Observational Study Comparing Body Mass Index, Liver Span and Lipid Profile Between Men and Women From Madurai

Medical Science

KEYWORDS : Lipid Fractions, Madurai, Liver Span, Body Mass Index, Correlation

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ABSTRACT

Heart disease is the number one cause of death in women, as it is in men. Our Hospital records show that women from Madurai have an increased incidence of Coronary Heart Disease (CHD) requiring CABG. This observational study aims to observe and analyze the gender differences between Blood lipid levels, Liver span and Body mass index as a prelude to a major proposed CABG study. Methods. 312 Females and 410 males were included in this study over a period of 8 months. Diabetics, Hypercholesterolemia, hepatobiliary diseases, myeloproliferative disorders, cardiac diseases and alcoholics were excluded. Blood lipids, sonographic measurement of the liver span, weight and height were measured. Subjects were divided as Group 1 (age 16 to 30) Group 2 (age 31 to 45) Group 3 (age 46 to 60) Group 4 (more than 60 years). Results: Maximum number of cases with abnormal TC, LDL and HDL were seen with group 2 and group 3 males. Group 3 females showed the maximum number of abnormal cases with TC, TGL, and LDL. Liver size significantly correlated well with BMI in all groups of men and females. There was significant correlation between liver size and TGL in group 2 and VLDL in group 3 and group 4 ($p = <0.05$) in females. In contrast there was no correlation between liver size and TGL and VLDL in group 3 and group 4 in the males. A highly significant negative correlation was seen between Liver size and HDL with group 4 females. This study hypothesizes that dyslipidemia in women from Madurai occurs at an early age and there are significant gender differences in blood Lipids and women are more prone for dyslipidemias than men from Madurai.

INTRODUCTION

Heart disease is the number one cause of death in women, as it is in men. The misconception that women are at low risk of Coronary Heart Disease (CHD) has been influenced by many large studies of cardiovascular disease in which women are underrepresented, with the (1,2,3,4) majority of trials being conducted in White, middle aged men (1- 4). This has resulted in biased treatment and worse outcome for women with CHD than men. It is observed from our hospital records that Women from Madurai district of Tamil Nadu India have shown an increased incidence of Cardiovascular Disease (CVD) requiring CABG (Coronary Artery Bypass Graft) compared to studies from other parts of India. From the northern parts of India Yadava et al., (13) reviewed 3500 patients who underwent CABG over 8 years period and reported 14.6 % of them to be women. Elsewhere in India 1000 consecutive patients who underwent elective CABG were reviewed by Kasliwal et.al.,(5) of which 88.4% were male and 11.6% were females. Within a period of Six months (July 2015 to Dec 2015) 81 CABGs were done in our hospital of which 66 were male (81.4%, mean age 58.9 ± 9.5 SD) and 15 were female (18.5%, mean age 54.8 ± 9.0 SD). Women from this geographical location of Madurai has shown a 4% to 8% increased incidence in CHD requiring CABG compared to CABG studies from other parts of India. Cardiovascular Disease evolution is multifactorial. Our institution has proposed a major study to explore this increase in incidence from this location. As a preliminary observation, this study aims to observe and analyze the gender differences in Blood lipid levels, Liver span and Body mass index from this geographic location of Madurai

METHODS

All adults who visited the master health checkup clinic of our hospital were included in this study. 722 patients were inducted into this study including 312 Females and 410 males over a period of 8 months. All investigations included in this study were routine investigations for those visiting the master health checkup clinics. Those with history of diabetes, Hypercholesterolemia, hepatobiliary diseases, myeloproliferative disorders, cardiac

diseases and alcoholics were excluded. Following recording of Medical history and personal data (blood pressure, weight, height and age) they were sent for ultrasound abdomen and estimation of fasting serum lipid fractions. For statistical analysis the patients were divided into four groups based on their age, Group 1 (age 16 to 30) Group 2 (age 31 to 45) Group 3 (age 46 to 60) Group 4 (more than 60 years). This study was approved by Institutional ethics committee.

The sonographic liver examinations were performed using diagnostic sonographic units (GE VOLUSON P8 Ultrasound and SIEMENS ACUSON X300) with a 2–5-MHz convex probe. The abdominal sonographic examinations were performed using the method of Boerner et. al., (2) by specially trained examiners. As much as possible, identical settings were maintained for all units. The greatest craniocaudal liver span in the Mid Clavicular Line was measured under conditions of maximum inspiration and supine position.

Blood Lipid profile was estimated using enzymatic methods in Beckmans coulters auto analyzer AU 480. Pearson's correlation was used for statistical analysis. All data were analyzed using SPSS, version 21 (SPSS Inc., Chicago, IL.). The data was analyzed using statistical tests and were presented using mean ±SD.

RESULTS

From among the total of 410 males included in this study, the maximum numbers of cases with abnormal lipid lev-

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els were found with TC, LDL and HDL (35.00%, 68.70% 21.70% respectively) with group 2 and group 3 (36.10%, 65.70% , 25.00% respectively) Table 1 and Graph 1. However from the 312 female subjects highest number of cases with abnormal levels of TC (41.90%), TGL (43.40%), and LDL (43.40%) were found in group 3. Table 2 and Graph 2.

Liver size significantly correlated well with BMI in all groups of men. Women showed significant correlation with group 3 and group 4 (P = < 0.05). Significant correlation between liver size and TGL in group 2 and VLDL in group 3 and group 4 (p= <0.05) were seen in women. In contrast there was no correlation between liver size and TGL and VLDL in group 3 and group 4 in the male groups and a significant correlation was found in group 1 males. Only the female subjects showed a highly significant negative correlation between Liver size and HDL with group 4.

DISCUSSION

The observation in this present study from the geographical location of Madurai exhibits significant gender differences in lipid profiles based on their age groups.

The male subjects consistently showed high number of cases with abnormal TC, LDL and HDL in all age groups, the maximum number of cases with group 2 (ages 31 to 45 yrs.) and group 3 (ages 46 to 60 yrs.). Men from this geographic area seem to be more prone for CHD at an early age which is reflected well from our hospital records the mean age for CABGs done in our hospital is 58.9 ± 9.5 SD for men. However the distribution of abnormal cases of lipid fractions among females from this geographic location seems to be different from that of men. There is a consistent significant increase in the number of abnormal cases of TC, TGL and LDL in group 3 (ages between 45 to 60 yrs.). Women from this area seemed to be more prone for CHD from an early age which is in line with our Hospitals records of CAGBs done in females (mean age 54.8 ± 9.0 SD).

Net cholesterol balance and the level of circulating lipid fractions depend critically upon events taking place in the liver. Liver plays an important role both in absorption and synthesis and in regulating the steady- state concentration and maintaining cholesterol balance across individual organs and the whole animal. Several studies have demonstrated that liver size depends upon several factors: age, gender, and nutrition and body surface area. (8 - 11) Furthermore, establishing the hepatic span may indicate hyperactivity of the liver and by assessing these physical parameters would improve the accuracy of clinical assessment (8).

Men in all age groups have shown a positive significant correlation with Liver span and BMI, women have also shown significant positive correlations Between Liver span and BMI except in group 1 (ages between 16 to 30 yrs.). There were no correlations between Liver span and TC in both male and female groups. There is a significant correlation between Liver span and TGL only in male group 1 (ages 16 to 30 yrs.). In contrast The females showed a significant correlation between Liver span and TGL in group 2 (ages 31 to 45 yrs.) and group 3 (ages 46 to 60 yrs.). Women from this region have exhibited a significant correlation between Liver span and VLDL with group 2 (ages 31 to 45 yrs.) group 3 (ages 46 to 60 yrs.) and group 4 (ages > 60 yrs.) which is not the case with males. There is a significant negative correlation between liver span and HDL with group 4 (ages > 60yrs.) in women. These data suggest that with both male and female groups the liver span seems increase with age and BMI, and women's liver show hyperactivity with TGL, VLDL (groups 2 , group 3) and a decreased activity with HDL (group 4) which is not seen with male groups. This agrees with our observation from our hospital records that the women from Madurai are more prone for CHD because of dyslipidemia from an early age.

There is very little known about the precise role of hypertriglyceridemia in atherogenesis in women and older patients consequently the role of triglycerides in CVD risk remains controversial. However observational studies suggest that TGL may be particularly an important risk factor in the elderly, the majority of whom are women. (7) Another observational study (4), has indicated that TGL is a risk factor for mortality arising from CVD in women > 65 years; We hypothesize that dyslipidemia in women from this geographical location during early age (ages 31 to 45yrs) may predispose them for the increased incidence of CVD requiring CABG. We hypothesize that there are significant gender differences in Lipid handling by the Liver and that women are more prone for dyslipidemias than men from Madurai.

Table 1

Male	Total cholesterol		TGL		LDL		VLDL		HDL	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Age Group 16-30	27	12	38	0	20	17	32	5	11	27
	69.20%	30.80%	100.00%	0.00%	54.10%	45.90%	86.50%	13.50%	28.90%	71.10%
Age Group 31-45	76	41	116	1	36	79	90	25	57	60
	65.00%	35.00%	99.10%	0.90%	31.30%	68.70%	78.30%	21.70%	48.70%	51.30%
Age Group 46-60	94	53	147	0	48	92	105	35	62	85
	63.90%	36.10%	100.00%	0.00%	34.30%	65.70%	75.00%	25.00%	42.20%	57.80%
Age Group > 60	84	24	107	1	43	63	85	21	44	64
	77.80%	22.20%	99.10%	0.90%	40.60%	59.40%	80.20%	19.80%	40.70%	59.30%
Total	281	130	408	2	147	251	312	86	174	236
	68.369	31.63	99.51	0.48	36.93	63.06	78.39	21.6	42.43	57.56

Various lipid fractions in Men from Madurai expressed as percentage. TC= Total cholesterol, TGL= Triglycerides, LDL = Low Density Lipoproteins, VLDL = Very low density Lipoproteins, HDL = High Density Lipoproteins

Graphic representation of the percentage of abnormal cases of Lipids in Men.

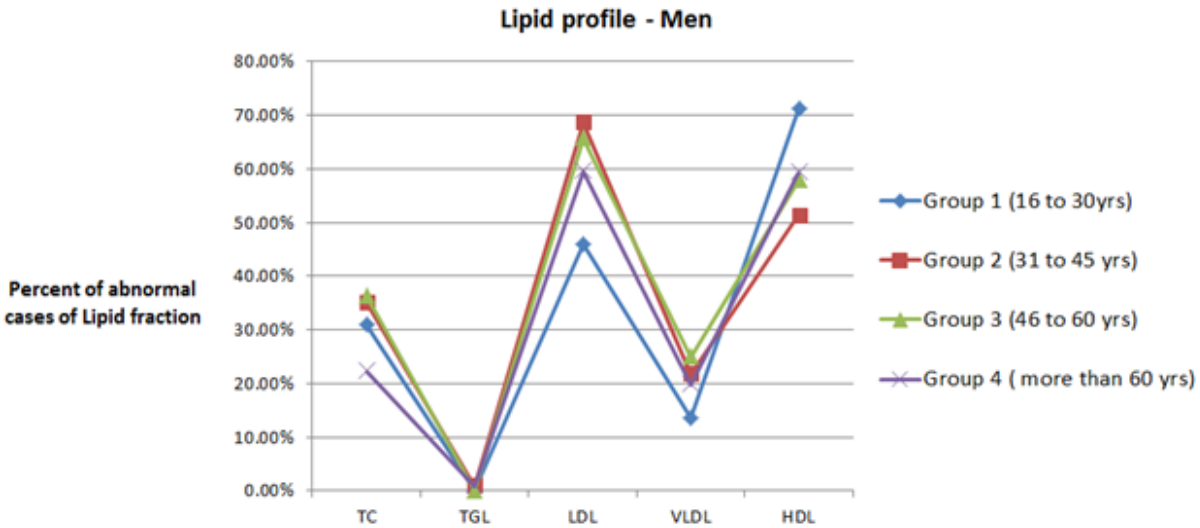
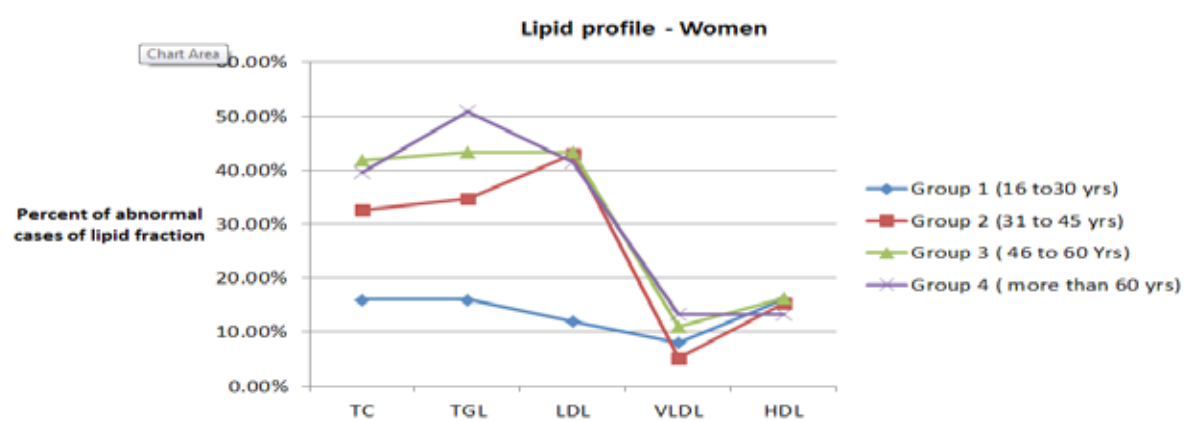


Table 2

Female	Total cholesterol		TGL		LDL		VLDL		HDL	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Age Group 16-30	21	4	21	4	22	3	23	2	21	4
	84.00%	16.00%	84.00%	16.00%	88.00%	12.00%	92.00%	8.00%	84.00%	16.00%
Age Group 31-45	66	32	64	34	56	42	93	5	83	15
	67.30%	32.70%	65.30%	34.70%	57.10%	42.90%	94.90%	5.10%	84.70%	15.30%
Age Group 46-60	79	57	77	59	77	59	121	15	114	22
	58.10%	41.90%	56.60%	43.40%	56.60%	43.40%	89.00%	11.00%	83.80%	16.20%
Age Group > 60	32	21	26	27	31	22	46	7	46	7
	60.40%	39.60%	49.10%	50.90%	58.50%	41.50%	86.80%	13.20%	86.80%	13.20%
Total	198	114	188	124	186	126	283	29	264	48
	63.50%	36.50%	60.30%	39.70%	59.60%	40.40%	90.70%	9.30%	84.60%	15.40%

Various lipid fractions in Woen from Madurai expressed as percentage. TC= Total cholesterol, TGL= Triglycerides, LDL = Low Density Lipoproteins, VLDL = Very low density Lipoproteins, HDL = High Density Lipoproteins



Graphic representation of the percentage of abnormal cases of Lipids in Women

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Table 3

Male		BMI		TC		TGL		LDL		VLDL		HDL	
		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
AGE 16- 30 Liver Size	Pear Cor	.652**	0.268	0.177	0.093	.477**	0.144	0.007	0.077	.483**	0.133	0.061	-0.018
	Sig.	0.001	0.426	0.281	0.657	0.002	0.494	0.966	0.713	0.002	0.525	0.761	0.933
AGE 31- 45 Liver Size	Pear Cor	.350**	.296*	0.001	-0.132	0.157	.356**	0.038	-0.199	0.125	.266*	0.078	-0.143
	Sig.	0.003	0.037	0.998	0.195	0.091	0.001	0.691	0.05	0.182	0.009	0.405	0.159
AGE 46- 60 Liver Size	Pear Cor	.564**	.323**	0.015	0.037	0.015	.214*	0.016	0.001	0.075	.079**	-0.047	-0.103
	Sig.	0.001	0.003	0.86	0.667	0.858	0.012	0.853	0.998	0.379	0.036	0.569	0.233
AGE >60 Liver Size	Pear Cor	.455**	.504**	0.077	-0.059	0.115	0.208	0.038	-0.226	0.106	.202**	0.059	-.353**
	Sig.	0.001	0.003	0.43	0.672	0.235	0.136	0.698	0.11	0.278	0.015	0.545	0.01

Correlation between Liver size, BMI and Lipid fraction in Men and Women from Madurai.

Significant - p = < 0.05,** = Highly significant ,* = Moderately significant.

CONCLUSIONS

In conclusion, this preliminary observational analysis hypothesizes that dyslipidemia in women from this geographical location during early age (ages 31 to 45yrs) may be the cause for the increased incidence of CVD requiring CABG, and that there are significant gender differences in Lipid handling by the Liver and that women are more prone for dyslipidemias than men from Madurai. These findings may have clinical implications for life style modification or drug therapy, but requires confirmation in larger studies considering other cardiovascular parameters.

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