ORIGINAL ARTICLE

A STUDY ON CARDIO VASCULAR RISK FACTOR PROFILE OF MEDICAL STUDENTS IN A TERTIARY CARE HOSPITAL OF CENTRAL KERALA

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ABSTRACT

Background: Life style related behavioural risk factors are attributed for increased burden of cardio- vascular diseases. Research related to these risk behaviours among medical students is essential, considering their role as future physicians.

Objectives: To estimate the prevalence of cardiovascular risk factors, association between risk factors and gender and correlation between anthropometric parameters and lipid profile and blood pressure among first year students.

Methods: A cross sectional study was carried out among 144 medical students. Using a pretested questionnaire information about family history of coronary artery disease, tobacco and alcohol use, total physical activity were collected. Blood pressure, anthropometric and metabolic parameters were measured.

Results: Cardiovascular risk factors observed were low High Density Lipoprtein(HDL)(33%), high Waist circumference (WC) (23%), Overweight (15%), Obesity (12%), high Systolic Blood Pressure (SBP) (10%), high Diastolic Blood Pressure (DBP) (21%), low physical activity (13%), high Atherogenic Index (AI) (16%), Family history of coronary heart disease(12%), high Triglyceride (TG)(13%) and high Low Density Lipoprtein (LDL)(5%). Prevalence of at least one coronary heart disease risk factor was 75% among the study subjects with 95% confidence interval (95%CI ,75±7) 68-82. The risk was more among females (77%) compared to males (73%). There was significant positive correlation between Body Mass Index (BMI), WC with lipid parameters and BP. There was statistically significant difference between mean values of HDL (0.001), TG (0.001), AI (0.001), WC (0.02), BMI (0.01) between those with and without risk factors.

Interpretation & conclusion: High Prevalence of cardio vascular risk factors in these young medical students draws attention to the need of initiating primary prevention programmes at the campus level.

Key words: Cardiovascular risk factors, Body Mass Index, Waist Circumference, Lipid profile, young medical students.

INTRODUCTION

Cardio vascular diseases (CVD) especially coronary heart disease (CHD), has assumed epidemic proportion in India [1]. CVD accounts for greater than 17 million deaths globally each year (30% of all deaths), 80% of which occur in low and middle income countries and this figure is expected to grow to 23.6 million by 2030[2]. World Health Organisation have predicted that by 2015 AD the most important cause of mortality and morbidity in India will be coronary artery disease[3]. Nearly half of deaths due to CHD are likely to occur in young and middle aged individuals (aged 30-69 years).

Coronary Artery Disease(CAD) is a chronic process that begins during adolescence and slowly progress throughout life. According to INTER HEART STUDY [4] seven easily measured and potentially modifiable risk factors (diabetes mellitus, hypertension, cigarette smoking, alcohol consumption, dyslipidaemia, sedentary life style and obesity), family history of coronary artery disease and gender accounts for 90% of risk of an initial acute myocardial infarction. In adults effects of risk factors are additive, the greater the number of high risk factors present, the greater the risk for cardiovascular diseases.

Adult Treatment Panel Report of National Cholesterol Education Program (NCEP-ATP)[5] recommended that all adults aged 20 years and above should have their cholesterol measured, every five years. Primary prevention of CAD by risk factor identification and education in the community, has better benefits compared to secondary prevention of cardiovascular mortality as well as morbidity.

Data of cardiovascular risk factors among youngsters, especially medical student population in Kerala is limited. In these well educated future doctors various approaches can be undertaken to modify and prevent premature myocardial infarction. This study was intended to identify the coronary risk factors and to implement preventive measures so that incidence of coronary artery disease can be reduced.

AIMS AND OBJECTIVES

A cross sectional study was planned to estimate the prevalence of cardiovascular risk factors among first year medical students. Second objective was to find out the association between gender and various risk factors and also the correlation between anthropometric parameters and lipid profile and blood pressure.

MATERIALS AND METHODS

A medical institution based cross-sectional study was conducted among MBBS students in a tertiary care centre of central Kerala during the period of May 2008 – June 2008 after approval by the institutional ethics committee.

A study population consisted of first year medical students sample size was estimated using the formula $n=(Z^2 \times p \times q)/d^2$

n = sample size, z = 1.96, p = the prevalence, q = 1-p, d= is the relative precision

As the exact prevalence of cardiovascular risk factors among young adults in the area is unknown, the prevalence of (p) = (q) was considered 50% (the most conservative assumption) and d was set as 20% of prevalence. The calculated sample size was 96 and rounded to 100. Since the annual intake of students of this institution is 150 it was decided to cover the 150 first year students. But only 144 gave consent and participated in the study with a response rate of 96%.

Exclusion criteria-Students with any major illness and on any regular drugs were excluded.

Information regarding family history of onset of coronary heart disease in parent or grandparent before sixty years of age, life style habits like smoking and alcohol consumption were collected in predesigned questionnaires. Global Physical Activity Questionnaire was used to analyse the amount of physical activity of the study group.

Height and weight were measured using standardized techniques and equipments. Body Mass Index (BMI) was calculated by dividing weight by height squared(kg/m^2). Waist circumference was measured to the nearest 0.1 cm at the midpoint between tip of iliac crest and last costal margin in the back and at umbilicus in the front using a non-stretchable tape at the end of normal expiration with subject standing erect in a relaxed position. Blood pressure was measured using mercury sphygmomanometer in right upper arm in supine position after five minutes of rest. Reading of phase-I Korotkoff sound was taken as systolic blood pressure (SBP) and phase-v as diastolic BP (DBP) respectively. BP was measured three times with thirty seconds interval. The average of second and third measurements was used in analysis.

For biochemical analysis blood samples were collected from subjects after overnight fasting of twelve hours. Seven millilitres of blood was collected under aseptic precautions and two millilitres was used for fasting blood sugar estimation while five millilitres for fasting lipid profile estimation. Biochemical analysis was done using clinical chemistry analyser ERBA (XL) and serum total cholesterol, triglyceride, HDL-C and fasting blood sugar were estimated. LDL-C was estimated indirectly using the Friedwald equation.

Subjects with abnormal lipid levels and hypertension were referred to physician. All subjects were given advice regarding lifestyle modification.

Operational Definitions used:

1) Diabetes Mellitus-Fasting blood glucose ≥ 126mg/dl (based on American Diabetes Association (ADA) criteria)

2) Systemic Hypertension -BP≥140/90 mm Hg (JNC VII Criteria).

3) Dyslipidemia-(National Cholesterol Education Programme guidelines)

   Hypercholestrolemia - serum TC ≥ 200 mg/dl
   Hypertriglyceridemia -serum TG ≥ 150 mg/dl
   Elevated LDL-C -serum LDL-C > 130 mg/dl
   Low HDL-C - serum HDL-C < 40mg/dl for men and < 50 mg/dl in women
   High TC to HDL ratio (Atherogenic index) ≥ 4.5

4) Body Mass index(BMI)- ≥ 25 kg/meter square is obesity; ≥23 kg/meter square is over weight
   (As per revised standards for Asian Indians)

5) Waist Circumference (WC)- abnormal ≥ 80cm in females; ≥90 cm in males
   (As per revised standards for Asian Indians)

6) Physical Activity- levels were graded based on Global Physical Activity Questionnaire devised by WHO (World Health Organisation) which included questions about activity at work, about travelling to and from places, about recreational activities including sports and about sedentary behaviour. Different types of activities have been grouped together and given Metabolic Energy Expenditure (MET) values based on intensity of activity. Applying MET values to activity levels total physical activity was calculated. The values were analysed using Epinfo package.

   a) Vigorous/high physical activity -activity that require hard physical effort and cause large increase in breathing or heart rate.

   b) Moderate physical activity –activity that require moderate physical effort and cause small increase in breathing or heart rate.

   c) Sedentary/low physical activity – that does not fit with criteria for either vigorous or moderate physical activity.

7) Family history–subjects with family history of coronary heart disease in a parent or in a grandparent before sixty years of age were considered to have positive family history.

Statistical Methods:

The data was coded and entered in Microsoft excel and analysed using SPSS version 16.0.Physical activity was analysed using EPIINFO software. Continuous variables were summarised as arithmetic mean and standard deviation. Approximate normality was assessed for anthropometric and biochemical parameters. The differences in the anthropometric and biochemical parameters were compared using student t test .Odd's ratio and 95 % CI of Odd's ratio is calculated to find out the statistical significance of risk factor. The various parameters were further categorised according to cut off values and summarised by percentage. The frequency of cardiovascular risk factors per gender were compared using chi square test. Correlation between anthropometric parameters with blood pressure and lipid parameters were done by calculating Pearson's Correlation coefficient. For all statistical analysis the significance level was set at $p < 0.05$.

RESULTS

Descriptives of anthropometric, lipid profile, blood pressure and fasting blood sugar are described in the table – I. All the variables were normally distributed.

Among the various risk factors studied prevalence was highest for low HDL –C (33%) and lowest for LDL –C (5%). No study subjects were having diabetes mellitus and neither of them use tobacco nor alcohol. There was statistically significant association in the proportion of BMI, BP and HDL –C between male subjects and female subjects(table 2). Prevalence of atleast one risk factor was(108) 75% with 95% confidence interval was 75 ± 7(68 – 82). At least one risk factor was present in more number of females(50)77% than males(58)73%. The proportion of one and two risk factors were more for females 19/50((38%) and 15/50(30%) than males 19/58(33%) and 14/58(24%), but the proportion of three or more than three risk factors were more for males 25/58(43%) versus 16/50 (32%).

Table 1: Description of Anthropometric and lab parameters of study subjects

Clinical/ Lab / Anthropometric measures	Mean(SD) (n=144)	Males (n=79)	Females (n=65)
Height	166.18±9.9	172.11 (±7.7)	158.98±7.28
Weight	59.43(±12)	64.55 (±12.3)	53.23 (±8.13)
Waist circumferences	78 (±3.4)	80.76 (±8.88)	74.67 (±6.93)
Body mass index	21.407 (±3.05)	21.73 (±3.4)	21.06 (±2.53)
Systolic BP (mm Hg)	118.29 (±14.18)	123.67(±14.74)	113.14 (±11.46)
Diastolic BP (mm Hg)	81.18 (±8.5)	81.92 (±7.22)	77.48 (±6.81)
Total cholesterol (mg/dl)	162.7 (±24.9)	159.78 (±24.83)	166.31 (±24.8)
LDL (mg/dl)	93.85 (±23.7)	92.54 (±22.70)	95.45 (±24.96)
Triglyceride (mg/dl)	105.8 (±38.6)	112.54 (±38.77)	97.8 (±37.13)
HDL (mg/dl)	46.97 (±9.8)	44.01 (±9.06)	50.57 (±9.55)
Atherogenic Index	3.606(±.92)	3.78 (±1.04)	3.38 (±0.70)
FBS(mg/dl)	80.13(±8.5)	80.43(±8.4)	81.22(±8.32)

Table 2: Gender wise distribution of risk factors of CHD among study subjects

Risk Factor	Male (n=79) (%)	Female (n=65) (%)	Total (%)	P Value	Odds Ratio	95% Cl
Obese BMI ≥ 25	15(19)	2(3)	17(12)	**0.01**		
Over weight 23-24.99	10(13)	12(18)	22(15)			
Normal 18.5-22.99	54(68)	51(79)	105(73)			
WC (≥90cm males ≥ 80 cm females)	14 (18)	19 (29)	33 (23)	0.10	0.52	0.23-1.14
DBP ≥ 90	22 (28)	8 (12)	30 (21)	**0.02**	2.75	1.13-6.68
SBP ≥ 140	15 (19)	0 (0)	15 (10)	**0.0001**		
Low TPA	7 (9)	12 (19)	19 (13)	0.09	0.42	0.15-1.16
AI ≥ 4.5	16 (20)	7 (11)	23 (16)	0.12	2.10	0.81-5.48
FH of CAD present	10 (13)	7 (11)	17 (12)	0.72	1.2	0.43-3.35
TC ≥ 200	7 (9)	4 (6)	11 (8)	0.54	1.48	0.41-5.31
TG ≥ 150	14 (18)	4 (6)	18 (13)	0.05	2.8	0.96-8.21
HDL (< 40 in males < 50 in females)	20(25)	28 (43)	48 (33)	**0.02**	2.23	1.10 -4.52
LDL > 130	4(5)	3 (5)	7(5)	0.90	1.1	0.23-5.11

WC - Waste circumferences; DBP-Diastolic Blood Pressure; SBP- Systolic Blood Pressure; TPA – Total Physical activity; AI- Atherogenic Index; FH of CAD -Family History of Coronary Artery Disease; TC- Total Cholesterol

Table 3: Distribution of anthropometric risk factors among study subjects

Parameter	Mean±SD	P value
Body Mass Index		
Male		
Risk factor present (n=58)	22.42±3.56	0.002
Risk factor absent (n=21)	19.85±1.98	
Female		
Risk factor present (n=50)	21.42±2.54	0.01
Risk factor absent (n=15)	19.62±1.98	
Waist Circumference		
Male		
Risk factor present (n=58)	82.07±9.29	0.02
Risk factor absent (n=21)	77.14±6.90	
Female		
Risk factor present (n=50)	76.07±7.04	0.005
Risk factor absent (n=15)	70.74±4.90	

The mean values of anthropometric parameters like BMI and WC were statistically significant between those with risk factor present and absent among males and females (table3).

The difference in mean values of BP and TG was significant for males with and without risk factors but not for females. But for HDL and AI, the mean values were statistically significant while LDL – C and TC the difference were not statistically significant for subjects with and without risk factors among both genders (table 4).

WC and BMI showed significant positive correlation with BP. For all lipid parameters WC showed significant positive correlation except for HDL which was significant negative correlation, but BMI showed no significant correlation with TG and HDL (table 5).

Table 4: Gender wise distribution of bio chemical parameters and Blood pressure among study subjects

Parameters	Mean±SD	P value
Diastolic Blood Pressure		
Male		
Risk factor present (n= 58)	85.17±8.23	**0.0001**
Risk factor absent	77.90±6.11	
Female		
Risk factor present (n=50)	79.16±8.20	0.38
Risk factor absent	77.07±7.74	
Systolic Blood Pressure		
Male		
Risk factor present (n= 58)	125.59±15.23	**0.004**
Risk factor absent	115.05±9.91	
Female		
Risk factor present (n=50)	113.08±12.44	0.75
Risk factor absent	112.65±7.17	
Atherogenic Index		
Male		
Risk factor present (n= 58)	3.98±0.11	**0.004**
Risk factor absent	3.23±0.34	
Female		
Risk factor present (n=50)	3.50±0.72	**0.008**
Risk factor absent	2.96±0.46	
Total Cholesterol		
Male		
Risk factor present (n= 58)	161.97±27.25	0.19
Risk factor absent	153.76±15.35	
Female		
Risk factor present (n=50)	165.81±26.48	0.76
Risk factor absent	168.41±18.81	
Triglyceride		
Male		
Risk factor present (n= 58)	111.97±41.94	**0.03**
Risk factor absent	97.57±23.02	
Female		
Risk factor present (n=50)	101.38±68.60	0.15
Risk factor absent	85.87±29.81	
High Density Lipoprotein		
Male		
Risk factor present (n= 58)	42.64±47.81	**0.02**
Risk factor absent	9.77±5.28	
Female		
Risk factor present (n=50)	48.50±9.08	**0.001**
Risk factor absent	57.47±7.84	
Low Density Lipoprotein		
Male		
Risk factor present (n= 58)	94.50±24.45	0.20
Risk factor absent	87.14±16.23	
Female		
Risk factor present (n=50)	96.14±26.16	0.56
Risk factor absent	92.13±20.91	

Table 5: Correlation between anthropometric and biochemical parameters

Parameters	Correlation coefficient	P value
Body Mass Index		
Systolic Blood Pressure	0.352	0.0001
Diastolic Blood Pressure	0.329	0.0001
Total Cholesterol	0.174	0.03
Triglycerides	0.149	0.07
High Density Lipoprotein	-0.077	0.35
Low Density Lipoprotein	0.188	0.02
Waist Circumference		
Systolic Blood Pressure	0.459	0.0001
Diastolic Blood Pressure	0.307	0.0001
Total Cholesterol	0.172	0.03
Triglycerides	0.241	0.004
High Density Lipoprotein	-0.227	0.006
Low Density Lipoprotein	0.224	0.007

DISCUSSION

A cross-sectional study of coronary risk factor profile of 144 first year MBBS students of government medical college in central Kerala was conducted. The strength of the study was the active participation of 96% of students on one batch of medical students. This reflects the awareness of these students about coronary risk factors and the eagerness to know their status.

Currently in India deaths due to CVD occur at least a decade earlier than in developed countries. In agreement with various national[6,7] and international literatures[8,9] the data from the present study shows considerable prevalence of cardiovascular risk factors among these young adults.

Among the various lipid parameters the most commonly encountered risk factor was low HDL – C which is similar to the observations of Mohammed Y etal[10]. A multivariate analysis indicate that low HDL-C is a more significant predictor of CHD risk than HDL-C/TC ratio .the prevalence of low HDL – C was significantly more among females which is similar to the observations of a study done in North India[1]. Even though a male preponderance was observed in high TG,TC and HDL-C/TC ratio (AI) levels, it was not statistically significant. Equal prevalence was showed for high LDL –C among both genders. Observation made on lipid profile in our study is different from a study done in western India[11] in adolescents where hypercholesterolemia was present in 50% of subjects.

According to PDAY study[12] (Pathological Determinants of Atherosclerosis in Youth) a direct relationship exist between determinant risk factors and extent of atherosclerotic lesions in youth. Identifying distribution of risk factors of CAD in these young adults is essential for implementing of preventive strategies targeting reductions in cardiovascular morbidity and mortality in young population.

In the present study family history of CAD was present in 12% of subjects. This is similar to the observations in a population based survey done in Iran[13] to know the CAD risk factor prevalence. But this finding is different from the results of a similar study done in first year Brazilian university students[14] which showed higher prevalence of family history.

None of the subjects in our study group were smokers and nobody revealed having consumed alcohol. This may be due to the fact the study subjects included only first year students who may not have started that habit yet. There is possibility of withholding the information due to the stigma associated with drinking alcohol beverages .But many studies conducted among medical students showed considerable prevalence of smoking and alcoholism[7]. None had hyperglycaemia which may be due to their young age. Higher proportion of females had abnormal WC in this study which correspond to the finding observed in other studies[15,16].

In this study prevalence of hypertension was more in males. This is in concordance with a hypertension prevalence study [17] done in Kerala recently where prevalence of hypertension was 24% (in age less than thirty years) with male preponderance. DBP had a higher risk for males with an odds ratio of 2.75(95% CI; 1.13 – 6.68) and a p value of 0.02. The high rate of systemic hypertension in our study might be due to the urban dwelling and stressful daily routines.

In our study males were more physically active than females. The observed gender differences in physical activity were also reported in adolescents by McKenzie et al[18] from Southern California, USA .Similar gender difference in physical activity is observed by Akil et al in a study in adolescents of Delhi [8].

WC and BMI showed a strong positive correlation with blood pressure in our study similar to the findings of Deshmukh PR etal[19]. WC also showed strong positive correlation with all lipid parameters except HDL which showed a strong negative correlation and all were statistically significant. But BMI showed strong positive correlation for only TC and LDL. Similar findings were observed in a study done among college students in Saudi Arabia[20]. Hence WC is a better anthropometric measurement than BMI to predict metabolic morbidity in this study similar to the observations of Mohan V and Deepa R[21].This indicates the importance of early detection of this simple and inexpensive anthropometric parameter since the prevalence of central obesity (based on WC) is high as observed in other studies done in South India[22,23].

The mean values of BP, TG, AI and HDL– C were statistically significant for males with and without risk factors. Prevalence of at least one risk factor in the study group was 75% (108) with 95% confidence interval 75 ± 7(68 – 82). . In a study on coronary risk factors of patients under forty years admitted with acute coronary syndrome by Adhikari C M etal [24], two or more CAD risk factors were present in 85 % of subjects when family history was excluded. In the present study the proportion of one and two risk factors were more for females than males ,but the proportion of three or more than three risk factors were more for males. In adults the effects of risk factors are additive, the greater the number of risk factors present greater is the risk for CVD.

LIMITATIONS

The study subjects included mainly upper middle class young adults which may not represent the general population. More over the design being cross sectional it is not possible to draw inference about causal relationship.

CONCLUSION

The prevalence of coronary risk factors is high in the study group and some are modifiable by changes in life style. The prevalence of risk factors at this stage bears significant tendency towards development of disease in future. Educational programs aimed at motivating the adoption of healthy life style could be implemented along with therapeutic interventions. Primary prevention of the disease by risk factor reduction has better benefits compared to secondary prevention for cardiovascular mortality as well as morbidity .

Although our findings are related to upper middle class young adults this might very well be valid for other sections in the state, considering the pace at which social and educational development is happening.

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