Coronary Heart Disease Risk factors of in an urban locality of Eastern India

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ABSTRACT

Background: Cardio-vascular disorders with known and unknown risk factors are likely to become a major public health problem in Asia. Prevalence of risk factors of coronary heart diseases (CHD) has shown variations in different study settings that necessitates area specific research. **Objectives:** To assess the prevalence of risk factors of CHD and find out awareness amongst urban population. **Materials and Methods:** A cross-sectional study was conducted during May'13 – April'14 among 350 subjects of 25-64yrs selected by systematic random sampling. Data on socio-demographic, medical and personal history along with anthropometric measurements were collected through house-to-house visit. Blood sample was analyzed for fasting blood sugar, lipid profile. **Results:** Prevalence of risk factors CHD among males in decreasing order are high LDL (54.4%), low HDL (49.7%), high triglyceride (44.2%), central obesity and BMI ≥23 (43.5%). In females they are central obesity (59.6%), followed by sedentary life style (51.7%), high LDL (49.3%) and high BMI (40.9%). Prevalence of high blood sugar showed an increasing trend as age advanced with 7 to 8 fold rise in age group of 45-54 and 55-64 in comparison to 25-34 years. Awareness regarding traditional risk factors CHD ranged from 70% to 80%. Lack of physical exercise as risk factor was known to only 22%. **Conclusion:** Although awareness about risk factors CHD was encouraging, high prevalence of risk factors indicates lack of healthful practices in community.

Key words: Coronary Heart Disease, Dyslipidemia, Epidemiology, Life style, Obesity, Risk factors.

INTRODUCTION

Non-communicable diseases have contributed to approximately two third (63%) of global deaths in 2008 with almost half of them (48%) due to cardiovascular diseases (CVDs).[1] Nearly 80% of these deaths occurred in low and middle-income regions and the rates are expected to rise further over the next few decades.[1,2] Further, CVDs are important causes of worldwide preventable morbidity and mortality.[3,4]

Coronary heart diseases (CHD), a major proportion of CVDs has been associated with behavioral risk factors in close to 80% of cases.[1] The burden of CHD is varying in proportion at different places, societies and age groups with different prevalence of risk factors in varied proportions.[5] Out of 30 million patients with CHD in India, 14 million are in urban and 16 million in rural areas.[6] Such differences may be due to diet, body weight, physical activity, diverse life style and social structure which necessitate studies from multiple regions of the countries in developing National strategies for CHD prevention.[7] Authors have recommended primary prevention on population-based risk reduction programmes which is most cost-effective method to control rising epidemic of CHD.[3]

Although, global burden of CHD occurs in developing countries, knowledge about the importance of risk factors is largely derived from developed countries[8] and limited evidence on CHD and risk factors is available from areas with increased poverty in south Asian population groups. As per Integrated Disease Surveillance Project-Non Communicable Disease risk factor survey by Indian Council of Medical Research, the major behavioral risk

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factors were tobacco use, alcohol abuse, low physical activity, less consumption of fruits and vegetables and central obesity.[9] Prevalence of risk factors of CHD has shown variations in different study settings that necessitates area specific research.[10]

Availability of an urban population with fast changing life style pattern in the field practice area of Department of Community Medicine which can be easily followed up prompted to conduct this study with the objective of assessing the prevalence of risk factors of CHD and awareness about risk factors among adults.

MATERIALS AND METHODS

Study setting

This community based cross-sectional study was conducted during May 2013– April 2014, among 25-64 years population in the catchment area of Urban Health and Training Centre. As per survey during March 2012 the total population of the area was 9,222 in 2178 households and population in age group of 25-64 were 3,459. The population density is about 62 persons per hectare with a good access to health care provided by both public and private sector.

Sample size and sampling

Considering prevalence of dyslipidaemia of 54% in an urban population[12] using the formula $4pq/L^2$ with 10% allowable error and 95% confidence interval, sample size was calculated to be 341 and rounded off to 350. The study subjects were selected using systematic random sampling through house-to-house visit. Presuming at least two members in the eligible age group would be available in a household; every 12th house was visited in a systematic order starting from one randomly chosen household. All the eligible subjects in the household who were present at the time of the visit were included in the study till the desired number of 350 is reached.

Data on age, sex, family size, co-morbidity, history of CHD in family, history of diabetes mellitus, dietary habits, alcohol and tobacco use, physical activities were collected and their height, weight, waist-hip ratio, blood pressure, biochemical parameters etc. recorded on pre-designed and pretested questionnaire.

Tools of measurement

Height was measured to the nearest centimeter using calibrated stadiometer and weight was measured to the nearest 0.1 kg by a standard electronic weighing machine with clients in light dress and without footwear. Body mass index (BMI) was calculated as weight in Kg divided by height in meter square and BMI ≥ 23 was taken as a risk factor of CHD.[9] Waist and hip circumference was measured by flexible non stretchable measuring tape in standing. Waist circumference was measured at the midpoint between the lower margin of the last palpable rib and top of the iliac crest to nearest 0.1 cm. Hip circumference was measured to nearest 0.1 cm around the widest portion of the buttocks, with tape parallel to floor. For assessing central obesity, waist circumference of ≥ 102 cm in males and ≥ 88 cm in females was taken as cut off point as per National Cholesterol Education Program Adult Treatment panel III. Participants with history of treatment for hypertension or having systolic blood pressure ≥ 140 or diastolic blood pressure ≥ 90 (measured at 3 separate occasions) were considered as hypertensive.

Those who smoked at least 100 cigarettes in their lifetime and at the time of interview smoke everyday or some days in a week were considered as smoker. Those who consumed one or more than one drink in a month of any alcohol in the year preceding the survey was considered to be at risk. Similarly, those who reported engaging in non-occupational physical activity for more than 25 minutes a day were categorized as physically active and rest were considered leading a sedentary life style.

Blood samples were collected after overnight fasting and biochemical tests were done at the hospital laboratory by following methods; plasma glucose by Hexokinase, cholesterol by Cholesterol oxidase, HDL by Direct measure - PEG, triglycerides by Enzymatic end point (EQAS by BIO-RAD; Lab532902).

Data was analyzed using SPSS (20.0 v) software and proportions were expressed as percentage. Chi-square test was used for comparing between proportions. A p value of <0.05 was considered statistically significant.

Ethical considerations

Study was approved by the institutional ethics committee prior to start of the study and informed written consent was obtained from all study subjects. Clients with abnormal findings detected during the survey were managed at the attached tertiary care hospital.

RESULTS

All the 350 subjects who were contacted, participated in

Table 1: Prevalence of CHD Risk Factors across age groups

Age group / Risk factor	25-34 N=135 No (%)	35-44 N=115 No (%)	45-54 N=59 No (%)	55-64 N=41 No (%)	Total N=350 No (%)	p value
Central obesity	59(43.7)	61 (53.0)	34 (57.6)	31 (75.6)	185 (52.9)	0.004*
BMI (≥23)	58 (43.0)	46 (40.0)	26 (44.1)	17 (41.5)	147 (42.0)	0.951
High TG	34 (25.2)	50 (43.5)	27 (45.8)	20 (43.8)	131 (37.4)	0.002*
High VLDL	34 (25.2)	51 (44.3)	26 (44.1)	19 (46.3)	130 (37.1)	0.004*
High LDL	61 (45.2)	64 (55.7)	33 (55.9)	22 (53.7)	180 (51.4)	0.322
High cholesterol	20 (14.8)	39 (33.9)	20 (33.9)	17 (41.5)	96 (27.4)	0.001*
Low HDL	49 (36.3)	41 (35.7)	26 (44.1)	14 (34.1)	130 (37.1)	0.678
High blood sugar	6 (4.4)	14 (12.2)	13 (22.0)	13 (31.7)	46 (13.1)	0.001*
Hypertension	18 (13.3)	28 (24.3)	17 (28.8)	14 (34.1)	77 (22.0)	0.010*
Sedentary lifestyle	61 (45.2)	48 (41.7)	33 (51.2)	21 (51.2)	163 (46.6)	0.306
Smoking	12 (8.9)	11 (9.6)	6 (10.2)	3 (7.3)	32 (9.1)	0.965
Alcohol consumption	20 (14.8)	12 (10.4)	2 (3.4)	2 (4.9)	36 (10.3)	0.062

* indicates statistically significant

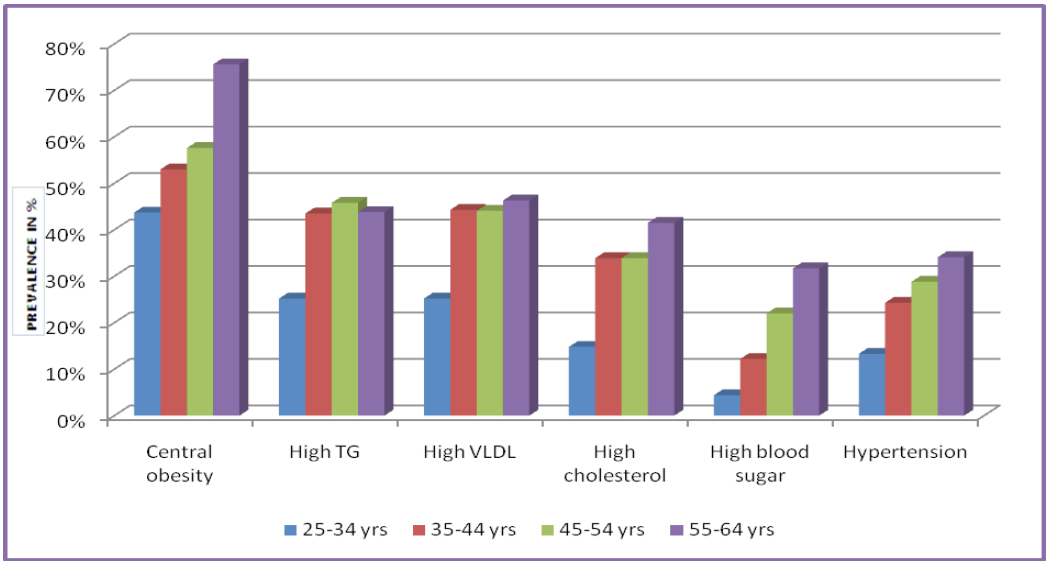

Figure 1: CHD Risk Factors having significant differences across age groups

the study that included 147 males and 203 females (M: F=1:1.38) with mean age of 39.3 ± 10.6 yrs (Male: 40.5 ± 11.37 yrs, Female: 38.43 ± 10.00 yrs). The females outnumbered the males may be owing to females being home makers were available at the time of visit. Close to 17% (59) of the study participants had never attended school and 35% (124) had schooling up to primary level.

Prevalence of risk factors of CHD

Prevalence of risk factors of CHD across different age groups are described in Table 1. The prevalence in decreasing order are central obesity (52.9%), high LDL (51.4%), sedentary life style (46.6%), BMI ≥ 23 (42.0%), high triglycerides level (37.4%), high VLDL (37.1%), low HDL level (37.1%), high cholesterol level (27.4%), hypertension (22.0%), high blood sugar (13.1%), alcohol consumption (10.3%) and smoking (9.1%). As noted, the prevalence of risk factors like central obesity, high triglycerides, high VLDL, high cholesterol, high blood sugar, and hypertension significantly increased as the age advanced (Figure 1).

Table 2 shows gender segregated prevalence of risk factors. As evident the prevalence of central obesity and sedentary life style was significantly higher among females, while high

Table 2: Prevalence of CHD Risk Factors across Gender

Gender / Risk factor	Male (n=147) No. (%)	Female (n=203) No. (%)	Chi sq value	P value
Central obesity	64 (43.5)	121 (59.6)	8.834	.003*
BMI(≥23)	64 (43.5)	83 (40.9)	0.246	.620
High TG	65 (44.2)	66 (32.5)	4.988	.026*
High VLDL	62 (42.2)	68 (33.5)	2.751	.097
High LDL	80 (54.4)	100 (49.3)	0.909	.34
High cholesterol	45 (30.5)	51 (25.1)	1.291	.256
Low HDL	73 (49.6)	57 (28.1)	17.008	.000*
High blood sugar	22 (14.9)	24 (11.8)	0.738	.390
Hypertension	36 (24.5)	41 (20.2)	0.916	.339
Sedentary lifestyle	58 (39.5)	105 (51.7)	5.157	.023*
Smoking	32 (21.7)	0	NA	NA
Alcohol consumption	36 (24.5)	0	NA	NA

* indicates statistically significant

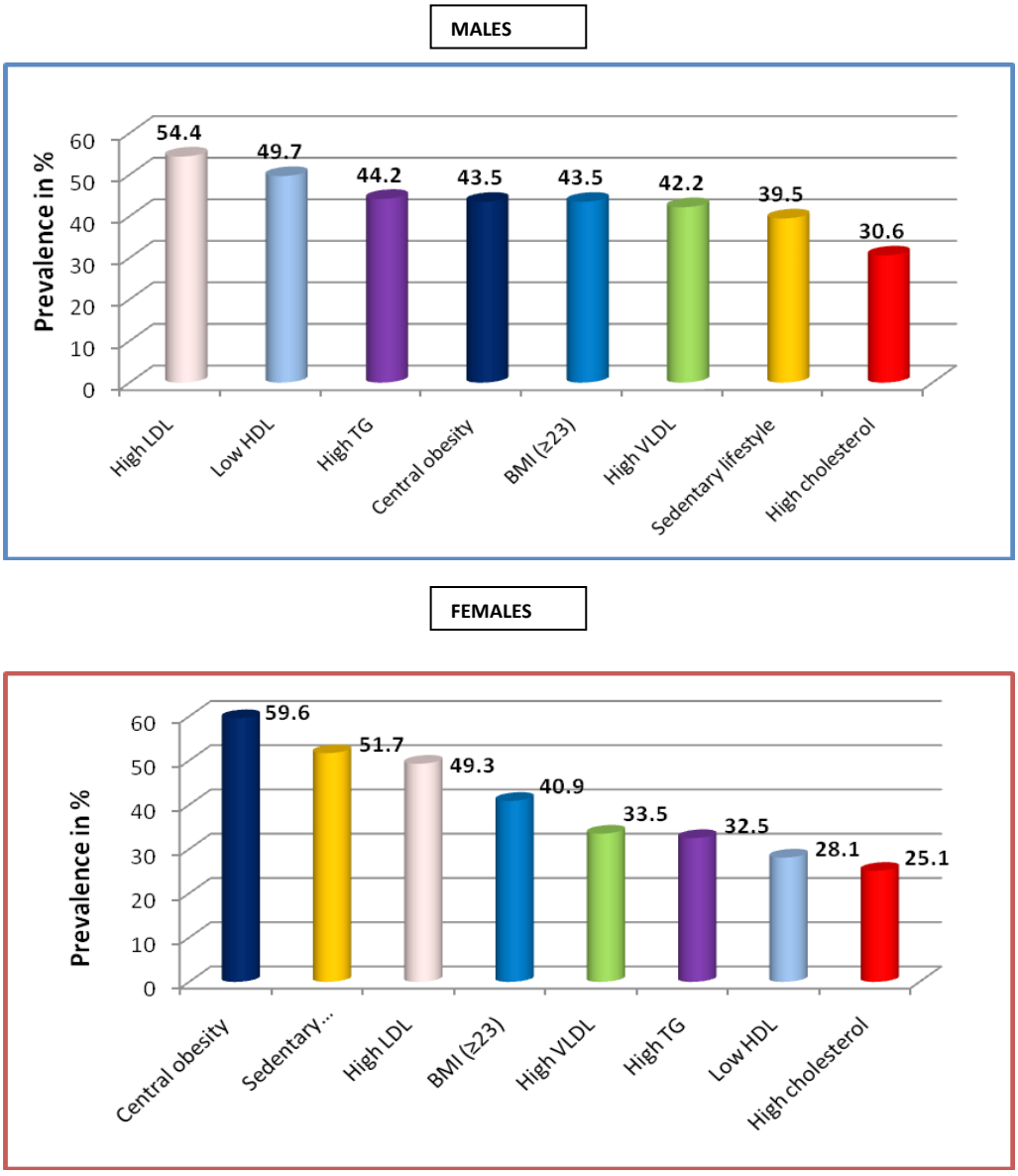

Figure 2: Gender differences in prevalence of CHD risk factors

Table 3: Awareness about coronary heart disease risk factors among the study subjects

Risk Factors	Aware number (%)			P value
	Male	Female	Total	
Tobacco chewing	43 (29.3)	25 (12.3)	68 (19.4)	0.001*
Smoking	119 (81.0)	156 (76.8)	275 (78.6)	0.650
Alcohol consumption	106 (72.1)	139 (68.5)	245 (70.0)	0.622
Lack of regular exercise	34 (23.1)	45 (22.2)	79 (22.6)	0.476
High fat diet	62 (42.2)	86 (42.4)	148 (42.3)	0.403
Overweight	89 (60.5)	121 (59.6)	210 (60.0)	0.898
High BP	126 (85.7)	186 (91.6)	312 (89.1)	0.079
High cholesterol	117 (79.6)	171 (84.2)	288 (82.3)	0.261
Diabetes mellitus	116 (78.9)	148 (72.9)	264 (75.4)	0.198
Worry/Anxiety/Stress	39 (26.5)	69 (34.0)	108 (30.9)	0.136
Family History	85 (57.8)	103 (50.7)	188 (53.7)	0.190
Increased age	14 (9.5)	35 (17.2)	49 (14.0)	0.032*

* indicates statistically significant

TG and LDL was significantly more among males. Figure 2 illustrates the risk factors in both sexes in descending order of prevalence. In males most prevalent risk factor was found to be high LDL followed by low HDL, high TG, central obesity, high BMI, high VLDL, indicating dyslipidaemia as an important risk factor among males. On the contrary among females central obesity and sedentary life style predominated.

Awareness about Risk Factors of CHD

Table 3 shows awareness about risk factors of CHD. Close to 89% knew high blood pressure as a risk factor. Similarly, awareness of other risk factors in decreasing order was high cholesterol (82.3%), tobacco smoking (78.6%), diabetes mellitus (75.4%), alcohol consumption (70.0%), over weight/obesity (60.0%) and family history of CHD (53.7%). About 70% were unaware that worry, stress and anxiety can lead to CHD. Lack of physical exercise as a risk factor was known to only 22%.

DISCUSSION

Recent times have witnessed rapid transition in life style owing to urbanization that resulted in increased incidence of reversible cardiovascular risk factors and increased number of CHD.[11,12] Despite high burden of the disease, competing priorities such as infectious and nutritional diseases compounded with factors like low literacy, lack of access to health care, has lead to poor awareness about the risk factors of CHD. Thus community based cross sectional studies carried out in different settings would help to identify 'risk markers' in order to develop area specific strategies for prevention.

Most common CHD risk factors in our study were central obesity, high LDL and sedentary life style. More than half of the participants were having central obesity and an increasing trend was observed as the age increased (Figure 1). A study in Berhampur in Orissa showed a prevalence of 48.9% while at Chandigarh[13] a similar prevalence (43.7%) was noted Gupta R *et al*[14] in Jaipur had reported even higher prevalence of trunkal obesity (57.4% in males 68.4% in females). In our study about 42% of study participants had BMI ≥ 23, which is similar to the findings of Pravakaran[15] (35%), Walia R *et al*[13] (43%), Prasad DS *et al* (43.8%, BMI <25)[7] and Thankapan KR *et al* (35.3%).[16]

High LDL level (51.4%) across all age groups was an important dyslipidaemia in our study, while more than one third of subjects had low HDL level, high VLDL and high TG. Most important dyslipidaemia observed by Prasad DS *et al*[7] was low HDL (46.9%). Slightly lesser prevalence of high LDL (45.2%), was reported by Walia R. *et al*[13] at Chandigarh but the prevalence of low HDL, high VLDL and high TG in our study was comparable to other studies.[15,16] On the contrary, Gupta R *et al*[14] had found low HDL (54.9% in males 54.2% in females) as the most common dyslipidaemia.

Though overall prevalence of hyper-cholesterolaemia in our setting was about 27%, there was a twofold rise of prevalence of high cholesterol among 35-44 and 45-54 ages as compared to 25-34 yrs. In Kerala, Thankapan KR *et al*[16] found nearly double the prevalence of hyper-cholesterolaemia (53.6%) and probably the highest as compared to other studies at Jaipur,[14] Delhi[15] and Chandigarh.[13] In Berhampur, Orissa study hypercholesteraemia was low (23.2%).[7] However prevalence of high triglycerides (17%) was less in Kerala as compared to our study, which may be attributed to the

dietary habits that need further exploration.

In our study prevalence of central obesity and sedentary life style was significantly higher among females, which was similar to the study by Gupta R *et al*[14] Further, as findings from our study revealed, most prevalent CHD risk factors found among males and females differed, which may have implications for development of behavioral modification strategies accordingly.

While epidemiological studies[17] have proven beyond doubt that physical inactivity increases the risk of CHD, nearly half of the participants in our setting had sedentary life style and the prevalence was even higher among younger age group of 25-34 yrs, which is alarming Walia R *et al*[13] showed even higher prevalence (63%) of sedentary life style in Chandigarh among the age group of 20-29 years. Sedentary life style was more prevalent among women as compared to men as noted in other studies.[13,18]

The prevalence of hypertension was low (22%) as compared to other studies[19] and prevalence of high fasting blood sugar (13.1%) was found comparable to studies by Pravakaran D,[15] (15%) and Thankapan KR,[16] (13.1%). More than one fifth were smoking tobacco and taking alcohol which is similar to study by Thankapan K.R[16] in urban slum of Kerala.

About 70% were unaware that worry, stress and anxiety can lead to CHD and almost 22-30% did not have the knowledge that smoking, diabetes mellitus and excess alcohol could be the risk factors. Lack of physical exercise as a risk factor was known to only 22%.While close to 80% had some knowledge that high cholesterol is a risk factor and only 42% were aware that high fat diet is a risk factor probably owing to ignorance of link between two.

Inability to capture other risk factors and prevalence of cardio-vascular disease in the studied population is one of the possible limitations of the study.

CONCLUSION

The study revealed high burden of CHD risk factors like central obesity, high LDL and sedentary life style in this urban community. Dyslipidaemia such as high LDL, low HDL and sedentary lifestyle/obesity was found even among younger generation. Despite good awareness; high prevalence of CHD risk factors indicated lack of healthy practices in community. Focused health education with targeted behavior change communication adopted to develop healthy practice among this closed community will help reducing CHD risk factors.

ABBREVIATIONS

BMI: Body Mass Index

CHD: Coronary Heart Disease

CVD: Cardio Vascular Disease

HDL: High density lipoprotein

LDL: Low density lipoprotein

VLDL: Very Low density lipoprotein

TG: Triglyceride

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