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Current Status and Risk Factors of Coronary Heart Diseases in Urban and Rural Population of District Hapur and Bulandshahr

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Abstract
Coronary heart disease (CHD) is an emerging public health problem characterized by premature onset and high mortality. The aim of the present study was to highlight the major risk factors responsible for CHD. Present study reveals a striking prevalence and risk factors in the population of district Hapur and Bulandshahr. Hypertension (χ^2=9.81, d.f.=1, P=0.0024), dyslipidemia (χ^2=8.58, d.f.=1, P=0.0034), diabetes mellitus (χ^2=14.12, d.f.=1, P=0.0002) and tobacco smoking (χ^2=12.91, d.f.=2, P=0.0016) were the most important risk factors responsible for the premature development of CHD. Low fruits-vegetables intake, physical inactivity are next important risk factors. These risk factors are highly prevalent in this region. Prevention and control of premature CHD needs urgent control of these factors. Improving lifestyle with tobacco cessation, diet with more fruits-vegetables and low fat intake, appropriate physical activity are important to decrease the risk of CHD. Target oriented good control of hypertension, dyslipidemia and hyperglycemia in addition to educating the general population about the dangers and preventive measures of the diseases are required.

Key words: *Heart, CHD, CAD, Risk factors,*

INTRODUCTION

Coronary heart disease (CHD) is a common multifarious public health problem and responsible for considerable morbidity and mortality in Indian subcontinent [5 and 10]. In India coronary heart disease is characterized by premature onset and high mortality [16]. It has been predicted that these diseases will increase rapidly in the India and this country will be host to more than half the cases of heart disease in the world within the next 15 years [5]. Smoking, hypertension, dyslipidemia, diabetes and obesity are the manifestations of deviant lifestyles and responsible more than 90% of the new cases of CHD globally [3]. Several epidemiological studies revealed that the major risk factors of CHD like obesity, hypercholesterolemia, diabetes mellitus, hypertension and smoking increasing day by day

[6, 17 and 19]. Therefore increasing in the risk factors correlates positively with increasing CHD cases in India [4, and 7]. Present study was carried out from 2011-2013 to assess the current status and risk factor of CHD in urban and rural population of district Hapur and Bulandshahr, Uttar Pradesh. The present study is an attempt to highlight the risk factors closely associated with etiology and premature onset of CHD. The information derived from present study is considered important in determining the status and health risk assessment for CHD. It will also help in the prevention and rehabilitation of human population suffering from CHD.

MATERIAL AND METHODS

Present study was carried out from 2011 to 2013 in urban and rural population of district Hapur and Bulandshahr. For the study of risk factor analysis, a proforma was prepared that incorporated information regarding demographic, anthropometric and clinical data. This is included various factors such as age group, gender, place of residence, marital status, economical status, food habits, education, smoking habit, physical inactivity, diabetes mellitus, dyslipidemia and hypertension. During the study, 771 patients were randomly selected and included in the study. For the study of economical status, all registered population were divided in to four categories viz. low income group (monthly income up to Rs. 5000), lower middle income group (monthly income Rs. 5001-10000), upper middle income group (monthly income Rs. 10001-25000) and high income group (monthly income > Rs. 25000). Personal visits were made to each individual volunteer to collect the required information. The three criteria for the diagnosis of CHD were adopted i.e. clinically documented CHD, WHO–Rose questionnaire-positive angina, or electrocardiogram (ECG) changes. Fulfillment of any of these three criteria was taken as confirmation of diagnosis. However, there could be either an over-or under-diagnosis due poor interpretation of symptoms in an illiterate population. Therefore, the diagnosis of CHD was also confirmed on the bases of ECG findings (ST, T & Q wave changes or Q wave changes only). Therefore all selected patients were subjected to a 12-lead routine ECG using proper standardization. The blood pressure was measured using a standard mercury sphygmomanometer. At least two readings at 10-minutes intervals as per the WHO guidelines were recorded. If a high blood pressure (≥140/90 mmHg) was observed, a third reading was also taken after half hour. The lowest of the three readings was taken as the blood pressure. Hypertension was diagnosed if the systolic blood pressure was ≥140 mmHg and diastolic blood pressure ≥90 mmHg. Blood samples were collected using standard aseptic venipuncture techniques. Four to five ml fasting blood sample was collected from all selected individuals. Serum was separated and examined for the estimation of serum glucose and lipid study. Dyslipidemia was defined as the presence of total cholesterol ≥200 mg/dl, LDL cholesterol ≥130 mg/dl, HDL cholesterol <40 mg/dl or triglycerides ≥150 mg/dl. Diabetes was diagnosed by history of previously known diseases or fasting blood glucose >120 mg/dl. Physical activity was assessed by asking about both work-related and leisure-time activity.

Food intake category was assessed by direct asking to participant volunteers. Regarding smoking, in India smokers use tobacco in many ways i.e. rolled tobacco leaves (beedee), old Indian pattern of smoking (hukka), cigarettes and chewing tobacco. Therefore, all tobacco users with past tobacco users included in the smokers category. Epidemiological data were analyzed by involving Chi square analysis performed on the measured factors. Odds ratio (OR) and ninety five percent confidence interval (95% CI) of values were also calculated. The prevalence rates are given as percentage.

RESULTS

A total 771 persons were selected and analyzed according to the study parameters. Of the total number of subjects included in the study for the prevalence of CHD, 289 (37.5%) were from urban, and 482 (62.5%) were from rural population. The age factor analysis showed that 171(22.2%) persons were in the age group between 25-34 years, 139 (18%) were in the age group 35 to 44 years, 179 (23.2%) were in the age group 45 to 54 years, 126 (16.3%) were in the age group 55 to 64 years and 156 (20.2%) were the age of 65 years and above. In contrast of literacy status 160 (22.8%) subjects were illiterate, 218 (28.3%) had 10 years education, 260 (33.7%) had 11 to 12 years education and 133 (17.3%) persons were graduates, post graduates and professionals. Sex wise distribution showed that 531 (68.9%) persons were male and 240 (31.1%) were females. According to economical analysis 184 (23.9%) were from poor back ground, 240 (31.1%) were from lower middle group, 193 (25.0%) were from upper middle and 154 (20.0%) persons were from upper class group. Out of 771 subjects 156 (20.2%) were suffering from diabetes mellitus and 615 (79.8%) were non diabetic. Blood pressure analysis showed that 212 (27.5%) were suffered from hypertension and 559 (72.5%) were normal. Of the total participant subjects, (72.8%) were not taking appropriate amount of vegetables and fruits, only 210 (27.2%) persons were taking appropriate amount of vegetables and fruits in their diet. Out of 771 persons, 152 (19.7%), 229 (29.7%) and 390 (50.6%) persons were chain smokers, medium smoker and nonsmoker respectively. Concerning physical inactivity, of the total 771 persons, 549 (71.2%) were doing least, 96 (12.45%) were doing medium and only 126 (16.34%) were doing appropriate physical activity every day. Based on the lipid profile study, out of 771 persons 432 (56%) were the patients of dyslipidemia and only 339 (44%) were with normal study.

Out of 771 persons investigated for CHD 6.6% were positive from rural and 7.9% were positive from urban population. The age factor analysis showed that 2.3%, 4.3%, 7.3%, 9.5% and 14.1% subjects were positive in the age group of 25-34, 35-44, 45-54, 55-65 and 65+ years of age groups respectively. Regarding educational status 7.5%, 6.9 %, 6.9% and 9% were positive from illiterate, 10 years education, 11-12 years education and graduates/PG/ professional groups respectively. Of the total 531 males and 240 female subjects, 8.8% male and 4.5% female subjects were positive. Economical status revealed that 7.1%, 7.5%, 7.8% and 7.1 % persons were positive from

poor, lower middle, upper middle and upper classes respectively. (Table-1 and Fig-2).

Out of 156 diabetic patients 14.7% persons were positive while only 5.5% persons were positive from non diabetic category. Regarding blood pressure out of 212 hypertensive patients 12.3% were positive and only 5.4% subjects were found positive from non hypertensive group. Type of dietary intake was found to be a significant factor in the study population. 9.1% positivity was observed in the group of who were not taking appropriate vegetables and fruits and only 2.9% positivity were found in the subjects who were taking appropriate fruits and vegetables in their diet. Based on the smoking 4.1%, 10.0% and 11.8% persons were positive from non-smoker, medium smoker and chain smokers groups respectively. Physical inactivity also responsible for the early development of CHD. In the present study 3.2%, 4.2% and 8.9% subjects were showing positive correlation with the group of who were involved in the appropriate, medium and least physical activity respectively. Out of 432 subjects of dyslipidemia 9.9% were positive and only 4.1% subjects were positive in the subjects with normal lipid level. (Table-2 and Fig-1).

Fig- 1 Showing relationship between prevalence of CHD and various physiological disorders.

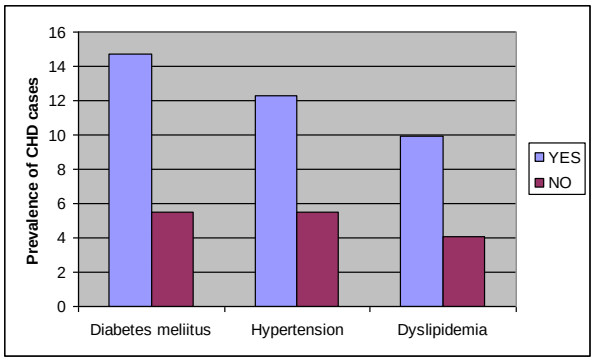

Table 1. Prevalence and adjusted odds ratios (OR) for Socio-demographic risk factor analysis for coronary heart disease

Characteristic	N=771	Patients having ECG changes regarding CHD (%)	OR (95% CI)
Age group (yrs)			
25-34	171	4 (2.3)	1
35-44	139	6 (4.3)	1.9 (0.52-6.81)
45-54	179	13 (7.3)	3.3 (1.05-10.23)
55-65	126	12 (9.5)	3.5 (1.10-11.03)
65+	156	22 (14.1)	6.9 (2.31-20.37)
Education			
Illiterate	160	12 (7.5)	1
10 yrs education	218	15 (6.9)	0.9 (0.41-2.00)
11-12 yrs education	260	18 (6.9)	0.9 (0.43-1.96)
Graduates/ PG	133	12 (9.0)	1.2 (0.53-2.82)
Place of Residence			

Urban	289	19 (6.6)	1
Rural	482	38 (7.9)	1.2 (0.69-2.15)
Gender**			
Male	525	46 (8.8)	1
Female	246	11 (4.5)	0.5 (0.25-0.96)
Economical Status			
Poor	184	13 (7.1)	1
Lower middle	240	18 (7.5)	1.1 (0.51-2.24)
Upper middle	193	15 (7.8)	1.1 (0.51-2.4)
Upper class	154	11 (7.1)	1.0 (0.44-2.33)

Age group $\chi^2=19.4,\ d.f.=4,\ P=0.0007$

Gender $\chi^2=3.9,\ d.f.=1,\ P=0.0483$

Fig- 2 Showing relationship between prevalence of CHD and age groups.

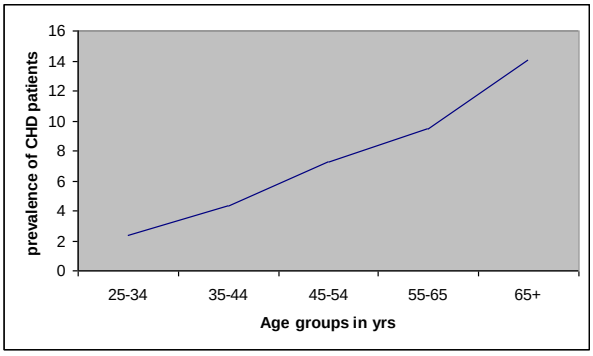

Table 2. Prevalence and adjusted odds ratios (OR) of CHD with various disorders and life styles habits

Characteristic	N=771	Patients having ECG changes regarding CHD (%)	OR (95% CI)
Diabetes mellitus			
No	615	34 (5.5)	1
Yes	156	23 (14.7)	3.0 (1.69-5.18)
Hypertension			
No	559	31 (5.5)	1
Yes	212	26 (12.3)	2.4 (1.44-4.12)
Low Vegetables and Fruits Intake			
No	210	6 (2.9)	1
Yes	561	51(9.1)	3.4 (1.44-8.05)
Smoking/ Tobacco			
No	390	16(4.1)	1
Medium	229	23(10.0)	2.6 (1.35-5.05)
Chain smoker	152	18(11.8)	3.1 (1.56-6.33)
Physical activity			
Appropriate	126	4(3.2)	1
Medium	96	4(4.2)	1.3 (0.32-5.44)
Least	549	49(8.9)	3.0 (1.06-8.44)
Dyslipidemia			
No	339	14 (4.1 %)	1
Yes	432	43 (9.9 %)	2.6 (1.38-4.77)

Diabetes mellitus. $\chi^2=14.12,\ d.f.=1,\ P=0.0002.$ *Hypertension.* $\chi^2=9.81,\ d.f.=1,\ P=0.0024.$

Low Vegetables and Fruits Intake. $\chi^2=7.79$, *d.f.=1, P=0.0053.*

Smoking/ Tobacco. $\chi^2=12.91$, *d.f.=2, P=0.0016*

Physical activity. $\chi^2=6.62$, *d.f.=2, P=0.0365*

Dyslipidemia. $\chi^2=8.58$, *d.f.=1, P=0.0034*

DISCUSSIONS

The result of the present study revealed over all CHD prevalence 7.39% in the rural and urban population of Hapur and Bulandshahr districts. It is similar to 6.18% in male subjects reported in a cross sectional survey was carried out in Jaipur to evaluate the major coronary risk factors [4]. In the present study statistically significant higher prevalence ($\chi2=3.9$, d.f.=1, *P=0.0483*) was observed in the male subjects as compared to female subjects. Odds ratio also reveals that females persons having lower risk of CHD as compared to male subjects (OR 0.5, 95% CI 0.25-0.96). This finding corroborates the findings of several authors [8, 9 and 10].

Mean age for first presentation of acute myocardial infraction in Indians was reported 55-64 years in a study of CHD conducted in Kerala [10]. Similar to this the mean age in Indian was reported 53 year. [1]. Above result are consistent to the present study in which a statistically significant positive association ($\chi^2=19.4$, *d.f.=4, P=0.0007*) was observed between age group and CHD positivity. Odds ratio also reveals that risk of CHD increases with the age. Education, place of residence, economical status did not reveal any relation with the positivity of CHD. In our study diabetes mellitus was found to be a major risk for CHD ($\chi^2=14.12$, d.f.=1, *P=0.0002*) in the study population. Odds ratio (OR 3.0 95% CI 1.69-5.18) also suggests that patients with diabetes mellitus have higher risk of the development of CHD as compared the non diabetic patients. Several studies also showed that the patients with diabetes mellitus were attributed to the CHD [11, 14 and 15]. A hospital based study of CHD was carried out in Kerala on 496 patients. In this study hypertension was seen as an insignificant risk factor among the study population [10]. This is contrary to the present study. In which higher significant prevalence of CHD was seen in the among hypertensive patients as compared to subjects with normal blood pressure ($\chi^2=9.81$, d.f.=1, *P=0.0024*). This agrees with the previous studies [2 and 11]. In the present study food factors were also studied and low fruit and vegetables intake was associated with the increased risk of CHD ($\chi^2=7.79$, d.f.=1, *P=0.0053*). Several studies support the findings of present authors [16 and 18]. However questionnaires do not accurately measures the food intake habits in the population and more complex tools are needed to accurately assess such activities. We did not use a comprehensive physical activity questionnaire and thus the data on food habits may not reflects the true status. Previous studies reported that smoking is an important risk factor [5, 12, 13 and 16]. Present study also revealed a statistically significant association between smoking and CHD ($\chi^2=12.91$, d.f.=2, *P=0.0016*). Our study shows that lack of exercise is a significant factor in the development of premature CHD ($\chi^2=6.62$, d.f.=2, *P=0.0365*). Prospective studies have identified that less of exercise is an important cardiovascular risk factor

[16]. Dyslipidemia is a well known important factor in the pathogenesis of CHD [11 and 15]. Above results are consistent to the present study in which a statistically significant positive association was observed between the dyslipidemia and pathogenesis of CHD (χ^2=8.58, d.f.=1, *P=0.0034*). Odds ratio (OR 2.6, 95% CI 1.38-4.77) also reveals that dyslipidemia act as a prominent cause of the CHD.

CONCLUSION

Present study reveals a striking prevalence and risk factors in the population of district Hapur and Bulandshahr. Hypertension, dyslipidmia, diabetes and tobacco smoking were the most important risk factors responsible for the premature development of CHD. Low fruits-vegetables intake, physical inactivity etc are next important risk factors. These risk factors are highly prevalent in the population of this region. Prevention and control of premature CHD needs urgent control of these factors. Improving lifestyle with tobacco cessation, diet with more fruits and vegetables and less fat intake and appropriate physical activity are important to decrease risk. Target oriented good control of hypertension, dyslipidmia and hyperglycemia in addition to educating the general population about the dangers and preventive measures of the diseases are required.

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