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Original Article

Risk factors for Cardiovascular Diseases: a Study at National Institute of Cardiovascular Diseases (NICVD)

S. Jabeen[1], M. Haque[2]

Abstract

To assess the relationship between Coronary Heart Disease and known risk factors at National Institute of Cardiovascular Diseases (NICVD). It was a case-control study among 308 respondents aged 40-60 years. Controls were matched by sex, religion and age (± 2 years). Cases were collected from National Institute of Cardiovascular Diseases (NICVD), and matched controls from Shaheed Suhrawardy Hospital, Dhaka during 2002 - 2003. Here, tobacco smokers were found to suffer more from Coronary Heart Disease (CHD) than non-smokers (OR= 5.61). The regular (OR= 6.92) cigarette smokers (OR= 11.24), who smoked for a duration of more than 20 years (OR= 5.2) were greater at risk of developing CHD than those who smoked biri, occasionally for a duration of less than 20 years. Oral contraceptive pill (OR= 3.87) had significant relation with development of CHD than non users. Other significant risk factors were family history of CHD (OR= 69.44) and hypertension (OR= 5.89). Similarly, majority of the sedentary occupation respondents developed CHD (OR= 17.2). Respondents having higher BMI, WHR, SBP and DBP suffered more from CHD. It can be concluded that family history of Coronary Heart Disease (OR= 36.80; p=.001), sedentary occupation (OR= 9.33; p=.001) and tobacco exposure (OR= 2.95; p=.001) has important role in developing CHD. By controlling family history of CHD and tobacco exposure, increased physical activity has important role in reducing CHD.

Key Words: Risk factors, Coronary Heart Disease (CHD), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), Body Mass Index (BMI), Waist Hip Ratio (WHR).

Introduction

Cardiovascular diseases are a major public health problem not only in our environment but also worldwide,[1] because they constitute the major cause of morbidity and mortality and account for the most expensive costs in medical assistance. As the leading cause of death, and its contribution to mortality is rising; deaths due to Cardiovascular Diseases (CVD) are expected to be double between 1985- 2015.[2] An important observation among the hospitalized patients in the country is that as many as 32% of the patients belonged to 41 and 50 years age group indicating premature occurrence of the disease. Male to female ratio is 8:1, which is higher as compared to that in other countries.[3]

The prevalence of coronary heart disease is known to be high in people of south Asian descent (subjects from India, Pakistan and Bangladesh). Moreover, Coronary Heart Disease (CHD) among them is often premature and occurs a decade earlier than that seen in Europeans and Americans.[4] However, its precise etiology and mechanisms remain incompletely understood. Although prevalence of conventional risk factors such as smoking, hypertension and hypercholesterolemia is not higher in South Asians than in other ethnic groups. In Asian populations, mortality and morbidity from CHD is occurring in people even with lower body mass index (BMI).[5]

Cigarette smoking doubles the risk for coronary artery disease, 30% of which are attributed to the number of cigarette smoked.[6]

Exercise, even in moderate degrees, has a protective effect against coronary artery disease and all causes of mortality. In addition, exercise may provide a number of other benefits, such as

1. Dr. Suraiya Jabeen, Assistant Professor Department of Community Medicine, Dhaka Medical college, Dhaka.

2. Dr. Musarrat Haque, Assistant Professor Department of Community Medicine, National Institute of Preventive and Social Medicine, Mohakhali, Dhaka.

Address of correspondence:
Jabeens2009@yahoo.com

elevation in HDL- cholesterol levels, a reduction in systemic arterial hypertension levels, and aid in reducing body weight.[7]

As a prevention issue, the aetiology of CVD is multifactorial. About two third of adult global population have one or more major risk factors for heart disease so, the prevalence of cardiovascular risk factors in the population is widespread.[7]

Materials And methods

This case-control study was approved by the institutional thesis review board. Sample size was calculated by using the formula of estimating the difference between two population proportions with specified absolute precision.[8] Three hundred and eight respondents were interviewed, 154 in each group, aged 40- 60 years. Incident cases of coronary heart disease were collected from National Institute of Cardiovascular Diseases (NICVD), Dhaka. Matched controls were newly admitted patients without symptoms of CHD, from Shaheed Suhrawardy Hospital, Dhaka. As NICVD is a super-specialized hospital for cardiovascular diseases only so, matched controls having diseases other than heart disease were collected from nearby Shaheed Suhrawardy Hospital. Attempts were made to control sex and religion. Age was matched with a variation of ± 2 years. After taking permission, face to face interviews were conducted in hospital wards and cabins by a semi structured questionnaire. Data were collected on socioeconomic status, smoking history, history of hypertension, diabetes, family history of CVD (including CHD, angina, myocardial infarction, hypertension, diabetes etc.), dietary intake and physical activity. Systolic blood pressure (SBP), diastolic blood pressure (DBP) and anthropometric measures were obtained.

All analyses were conducted in SPSS (Statistical Package for Social Sciences) for Windows (Version 12.0).

Results

Among the 308 respondents, 87.7% were male and 12.3% were female (Fig: 1). Male female ratio was 7:1. Majority (57.47%) of the respondents was in fifty and above year's group, among them ninety respondents (58.4%) were cases and eighty seven (56.5%) in control group (Fig: 2).

Among the CHD group majority (51.3%) were educated (HSC and above), where as majority (87.6%) were less educated (SSC and below) in non CHD group. Among the occupation, majority (74.7%) were service holder and businessmen in heart diseased group, and farmer in without CHD group.

Among the total respondents, 197(64.0%) were current smokers and 3 (1.0 %) were past smokers. All the females were non smoker and included in never smoker group. The mean duration of smoking among the current smokers was 27.63 years (± SD 13.78) in CHD and the same was 22.80 years (± SD 14.26) in non CHD. Chi-square test was also highly significant (χ^2 = 49.03; p=.001; OR= 6.07) for current smokers. The association between ever smoker and CHD was significant (χ^2 = 44.72; p=.001; OR= 5.61).

Chi-square test was done for duration of current smoking years, found significant with those who smoked for eleven to twenty years (χ^2 = 5.65; p=.02; OR= 2.17) and highly significant with those who smoked for twenty one and more years (χ^2 = 34.02; p=.001; OR= 4.01) (Table-1).

About 46.4% were current tobacco chewers; among them 61.5% respondents developed CHD. Among the nineteen heart diseased female, eleven (58%) were tobacco chewers. The association between current chewers and non chewers was highly significant (χ^2 = 28.84; p=.001; OR= 3.56).

Among 38 female respondents, 23.7% were past, 13.2% were current oral contraceptive pill users. Of them majority (57.9 %) developed CHD. The mean duration of taking pill was 13.66 (SD± 2.56) years in CHD group. There was significant association (P=.02) for current and ever OCP users with development of CHD.

In non CHD group all respondents BMI was within normal limit (< 25 kg/m^2). In CHD 35 (22.7%) respondents had BMI> 25 kg/m^2 (Table: 2). The association between BMI and development of CHD among the respondents was highly significant (t= 13.97; df= 306; p <.001; OR= 2.29). The WHR measurements shows that majority of the respondents (74.0%) in CHD had WHR more than .96 (Table: 1). Where as, majority in non CHD had WHR equal to or less than 96. The association between WHR and development of CHD among the respondents was highly significant (t= 8.25; df= 306; p= .001; OR= 9.34).

The relationship between CHD and systolic blood pressure (t= 5.63; df= 276.17; p <.001; OR= 3.07) and CHD and diastolic blood pressure (t= 4.43; df= 306; p <.001; OR= 4.65) were found highly significant.

The association between beef consumption and development of CHD was highly significant (t = 15.04; p <.001). Odds ratio (OR= 5.13) showed that those who consumed beef were 5.3 times at greater risk of developing CHD than those not consumed beef.

In the CHD group majority (64.9%) had family history of CHD, 59.7% had hypertension and 35.1% had diabetes. In non heart diseased group only four (2.6%) respondents had CHD in their families (Table-3).

Among the CHD group, 131 respondents had family history of NCDs (Table-3). About forty six (35.1%) respondents had relations with both father and mother; forty one (31.3%) respondents had relation with father, while 22.9% with siblings and 10.7% had relation with mother only. But in non CHD group the picture being quite different. Only fifty seven respondents had family history of NCDs, majority, (47.3%) were siblings.

Among the total respondents, 125(40.6%) had sedentary occupation and rest 183(59.4%) had non sedentary occupation. In the CHD group, majority 107 (69.5%) of the respondents had sedentary jobs and only forty seven (30.5%) had non sedentary jobs.

Forward stepwise logistic regression (Table: 4) was done to examine the relationship between coronary heart disease and other significant risk factors of the study.

Discussion

Our study showed that mean monthly income was about three times more in CHD, than non CHD group. This study accords with the findings of Zaman MA. et al.[9] and Reddy et al.[10] Where they found higher socio-economic groups have greater prevalence of CHD risk factors than lower socio-economic groups. These findings goes parallel with that majority of the CHD cases were from urban areas and majority of the controls were from rural areas.

The data like personal habits, dietary habits and physical activities were recorded as stated by the respondents. As such the validity of the results was dependent on the validity of the statement given by the respondents despite utmost efforts on

Tables and Figures

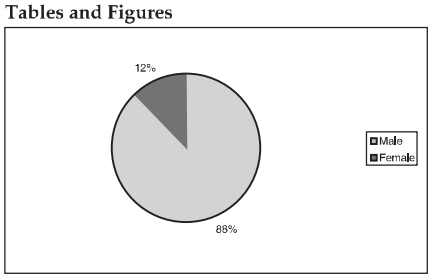

Fig: -1 Pie-chart showing sex distribution of the respondents

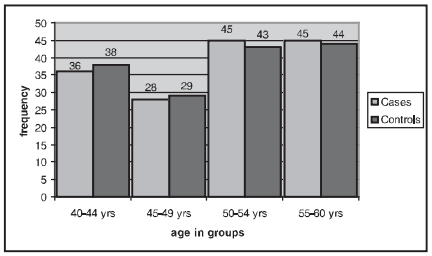

Fig: -2 Histogram showing age group distributions of the respondent

Table 1. Coronary heart disease risk with duration of tobacco smoking

(n= 192)

Variables	n	Test statistic	OR	95 % CI
≤ 5 years CHD Without CHD	 00 01	χ^2 = .29 df=1 p=.59	1.29	1.17- 1.42
6-10 years CHD Without CHD	 01 02	χ^2 = .34 df = 1 p = .56	.50	.05- 5.54
11-20 years CHD Without CHD	 31 16	χ^2 = 5.65 df=1 p= .02	2.17	1.13- 4.17
≥ 21 years CHD Without CHD	 96 45	χ^2 = 34.02 df=1 p= <.001	4.01	2.49- 6.46

* CHD=coronary heart disease

Table 2. Characteristics of coronary heart disease risks among the respondents

Variables	Respondents	
	Cases (Mean± SD)	Controls (Mean± SD)
Family income (Tk.)	10064.47 ±11999.87	3994.85± 2723.55
Duration of smoking (years)	27.63 ± 13.78	22.80 ± 14.26
Frequency of consuming beef (times per month)	8.43 ± 6.69	1.79 ± 2.13
Duration of inactivity time (hours in a typical day)	7.61 ± 2.75	2.50 ± 1.62
SBP (mmHg)	120.84 ± 17.23	111.69 ± 11.29
DBP(mmHg)	79.23 ± 8.04	72.74 ± 6.99
BMI (Kg/m2)	22.54 ± 2.999	18.19 ± 2.508
WHR	1.12 ± .697	.96± .642

* SBP=systolic blood pressure, DBP=diastolic blood pressure, BMI=body mass index, WHR=waist hip ratio

Table 3. Coronary heart disease and family history of selected Non-communicable diseases among the respondents

Variables	Respondents (%)		Total (%)	Test statistic
	Cases	Controls		
HTN Present Absent p<.001	 92(59.7) 62(40.3)	 31(20.1) 123(79.9)	 123(39.9) 185(60.1)	 $\chi^2 = 50.35$ df=1
CHD Present Absent DM	 100(64.9) 54(35.1)	 4(2.6) 150(97.4)	 104(33.8) 204(66.2) $\chi^2 = 133.79$	 df=1 p <.001
Present Absent p <.001	54(35.1) 100(64.9)	23(14.9) 131(85.1)	77(25.0) 231(75.0) $\chi^2 = 16.64$	df=1

* HTN=hypertension, CHD= coronary heart disease, DM= diabetes mellitus

Table 4. Forward logistic regression analysis, showing score values of the variables

Variables	Scores	p-value
Family income	92.06	<.001
Tobacco exposure	44.72	<.001
Family history of HTN	50.37	<.001
Family history of CHD	133.79	<.001
Sedentary activity job	106.65	<.001

the part of the investigator to maintain accuracy. According to their statement, all the female respondents were non- smokers, it may be that female tobacco smoking is unusual in our culture, and again, they might feel shy in admitting as they were accompanied by their parents or elder family members. About 73% males were current smokers, 1.11% past smoker and rest 26% were never smokers. Distribution also showed that 128 ever smokers males who developed CHD were also current smokers and majority smoked for more than twenty years. These results accords with Zaman MA. et al.[9] study. They showed that heavy cigarette smokers are much more susceptible to CHD; than the non-smokers.

Tobacco chewing is the common practice in our country and we found highly significant association between tobacco chewing and development of CHD, which accords with Rahman et al. findings.[11]

Among the thirty eight female respondents fourteen (36.8%) gave history of oral pill consumption. Of them eleven (78.6%) developed CHD. A significant association was found between OCP consumption and development of CVD, this similars with Zaman M.A. et al.[9] study.

Here, majority of the respondents gave family history of hypertension, CHD, diabetes and asthma. However these are established risk factors for developing CHD. We tried to find relationship with father, mother and siblings only. Majority had relation with parents and about one third with siblings. In this study about forty one percent of respondents had sedentary occupation. This study results accords with the study of Taylor et al.[12] where he found CHD was high among sedentary workers.

The relationship between BMI and development of CHD was found highly significant. This study accords with studies of Paeratakul,[13] they found strong association between BMI and the occurrence of CHD. Waist to Hip ratio (WHR) is a simple way of measuring abdominal obesity and considered as an important tool for assessing central obesity. This study accords with findings of Rim[14] and Ishizaki[15] they showed that higher waist to hip ratio was more strongly associated with CHD, and a higher WHR was associated with occupation. In our study higher WHR was found in sedentary occupation- businessmen and service holder.

The mean SBP for CHD was 120.84 mmHg and 111.69 mmHg for non CHD. The association for SBP & CHD was highly significant. Feskens[16] and co-workers found that higher systolic BP was significantly associated with CHD. The mean DBP for CHD was 79.23 mmHg and 72.74 mm Hg for non CHD. The association for DBP and CHD was highly significant. This study results accords with Feskens 16 study, where they found DBP was significantly associated with CHD.

To find out the relationship between CHD and its risk factors forward logistic regression analysis was done. Seven significant independent variables were taken for analysis. Among them, tobacco exposure, family history of CHD, sedentary activity job, moderate activity job and family income scored most. The study analysis suggested that for developing CHD, family history of CHD (OR=36.79; p= <.001), sedentary activity (OR=9.33; p= <.001) and tobacco exposure (OR=2.95; p= .01) has much influence. By controlling the family history of CHD tobacco exposure and physical activity has important role in developing CHD. Most of the dietary habits of the respondents were found significant but they could not be included in the analysis. Physicians can play a vital and active role in reducing CHD. The study further indicates that by controlling family history of CHD, decreasing tobacco exposure and increasing physical activity all contribute to reduce suffering from CHD and were effective measures in the prevention and control of CHD.

Conclusion

From this study, it is evident that a significant aspect of Coronary Heart Disease is largely preventable through the control of known major risk factors- smoking, unhealthy dietary habits and physical inactivity by population approaches. These approaches are rather cheap and easy to organize by government, non-government and even individual levels.

References

1. Gus I, A Fischmann. Prevalence of Risk Factors for Coronary Artery Disease in the Brazilian State of Rio Grande do. Arq Bras Cardiol, 2002; 78 (5): 484-90.

2. Reddy KS, Yusuf S, Emerging epidemic of cardiovascular disease in developing countries. Circulation. 1998; 97: 596-601.

3. Rashid KM, Khabiruddin Md, Hyder S. Textbook of Community Medicine and Public Health, 3rd edi, RKH Publishers, Dhaka. 1999; 264-5.

4. Enas EA, Yusuf S, Mehtz J L. Prevalence of coronary artery disease in Asian Indian. Am J Cardiol 1992; 70: 945-49.

5. WHO/ IASO/ IOTF. The Asia- Pacific Perspective: Redefining Obesity and its Treatment. Australia: Health Communication Pte Ltd; 2000.

6. Ockene JS, Miller NH. Cigarette smoking, cardiovascular disease, and stroke. A statement for healthcare professionals from the American Heart Association. Circulation 1997; 96: 3243-7.

7. Paffenberger Jr RS, Hyde RT, Wing AL, Lee IM, Jung DL, Kampert JB, The association of changes in physical- activity level and other lifestyle characteristics with mortality among men. N Eng. J Med 1993; 328: 538-45.

8. Lwonga SK, Lemeshow S. Sample size determination in health studies- A practical manual. WHO Geneva, 1991; 6-8.

9. Zaman MA, Yoshiike N, Rouf MA, Syeed MH. Cardiovascular risk factors: distribution and prevalence in a rural population of Bangladesh. J Cardiovasc. Risk. 2001; 8(1): 103-8.

10. Reddy KK, Rae AP, Ready TF. Socio-economic status and the prevalence of coronary heart disease risk factors. Asia Pac. J Clin. Nutn. 2002; 11(2): 98-103.

11. Rahman M, Rahman M, and Flora SM. Community based primary prevention of non communicable diseases- An intervention study. NIPSOM unpublished.

12. Taylor HL. Death rates among physically active and sedentary employees of the railroad industry. Am J Pub Health. 1962; 52(14): 1967-77.

13. Paeratakul S, Popkin BM, Keyou G. Changes in diet and physical activity affect the body mass index of Chinese adults. Int. J Obes. Relat. Metaab Disord. 1998 May; 22(5): 424-31.

14. Rim EB, Stampfer MJ, Glovannucci E, et al. Body size and fat distribution as predictors of CHD among middle aged and older US men. Am J Epidemiol. 1995; 141: 1117-27.

15. Ishizaki M, Yamada Y, Morikawa Y. The relationship between waist to hip ratio and occupational status and life- style factors among middle aged male and female Japanese workers. Occup. Med (London). 1998; 49(3): 177-82.

16. Feskens EJM, Kromhout D. Cardiovascular risk factors and 25 years incidence of diabetes mellitus in middle aged men. The Zutphen study. Am. J Epidemiol. 1989; 130: 1101-8.