



PREVALENCE OF CORONARY ARTERY DISEASE AND ITS ASSOCIATION WITH VARIOUS RISK FACTORS IN RURAL AREA OF NAGPUR

Umesh Sinha¹, Sumit Dutt Bhardwaj¹

Financial Support: None declared
Conflict of interest: None declared
Copy right: The Journal retains the copyrights of this article. However, reproduction of this article in the part or total in any form is permissible with due acknowledgement of the source.

How to cite this article:

Sinha U, Bhardwaj SD. Prevalence of Coronary Artery Disease and Its Association with Various Risk Factors in Rural Area of Nagpur. Ntl J Community Med 2016; 7(8):703-707.

Author's Affiliation:

¹Associate Professor, Community Medicine, CMCH, Bhopal

Correspondence:

Dr Umesh Sinha
Umi_sinha@yahoo.com

Date of Submission: 06-07-16

Date of Acceptance: 25-08-16

Date of Publication: 31-08-16

ABSTRACT

Introduction: Several factors appear likely to have contributed to the acceleration of CHD epidemic in India like demographic transition to an older population, as a result of increasing life expectancy and confluence of both conventional risk factors and non-conventional risk factors in Indians.

Material and methods: It was a cross-sectional study, carried out in three villages of a PHC. A total of 3771 study subjects aged 15 years and above were included in the study. It was conducted from July 2007 to December 2009. We examined the prevalence of CHD using WHO Rose Angina questionnaire and various risk factors of NCDs in central part of India using the WHO STEP approach.

Results: Prevalence of Coronary heart disease (affirmative response to ROSE questionnaire) among the study subject was 226 (6.0 %). In males it was 123 (6.3 %) while in females it was 103 (5.7 %). This difference was not found to be statistically significant ($\chi^2=0.529$, $df=1$, $P=0.467$).

Conclusion: Risk factors for coronary heart disease which were higher among males were Smoking, smokeless tobacco and alcohol consumption. While hypertension, Obesity ($BMI \geq 25 \text{ kg/m}^2$), sedentary type of physical activity, low fruits and vegetable consumption were the risk factors which were higher among females.

Key Words: Alcohol, CAD, CHD, Hypertension, Obesity, Smoking

INTRODUCTION

Cardiovascular diseases (CVDs) comprise of a group of diseases of the heart and vascular system. The major conditions are ischemic heart disease (IHD), hypertension, cerebrovascular disease (Stroke) and congenital heart disease. Between 2006 and 2015, half of the deaths due to NCDs globally are expected to be due to CVD. ¹ It accounts for 27% of all deaths in SEAR. ¹

Cardiovascular disease contribution has increased from 25.5% in 1990 to 30.2% for all cause mortality

in India. ² The prevalence of CHD has been reported to have increased from 1.05% in 1962 to 12% in 2001 in urban areas. ²

Multiple studies have clearly shown that CHD is a significant problem in India and coronary risk factors: hypertension, smoking, physical inactivity, obesity and truncal obesity, and improper diet leading to hyper-cholesterolaemia and hypertriglyceridaemia are widespread. ³

Literature shows us that there are various factors such as increase in older population, as a result of

increasing life expectancy and presence of both conventional risk factors and non-conventional risk factors in Indian population, which are played a significant role in the acceleration of CHD epidemic in India. ⁴ Multiplicative effects of conventional and emerging risk factors appear to provide a plausible explanation for the excess burden of CHD among Indians, many of whom are lean, non-smoking, vegetarian, yoga guru and marathon athletes.⁵ It is estimated that if incidence of CHD is brought to zero it would increase the life expectancy by 3 to 9%.⁶

The increasing burden of Non-communicable diseases (NCDs) particularly in developing countries threatens to overwhelm already stretched health services.⁷ It is estimated that globally in the year 2002, NCD contributed 60% of deaths and 43% of global burden of disease and by 2020, it is projected to account for 73% of deaths and 60% of disease burden.⁸ Almost half of the disease burden in low and middle-income countries is already due to NCDs.⁹

The present study examines the prevalence of CHD using WHO Rose Angina questionnaire¹⁰ and various risk factors of NCDs in central part of India using the WHO STEP approach.¹¹

MATERIAL AND METHODS

Study type and place

The present cross-sectional community based study was carried out in three villages of PHC Khapa, namely Sawangi, Wakodi and Kodegaon, Tehsil Saoner, District Nagpur to study the prevalence of coronary heart disease and some known risk factors in people above 15 years in rural area of Nagpur

Study Population

PHC Khapa was randomly selected to carry out the present study. Total population of Wakodi, Sawangi and Kodegaon was found to be 5624 in our study. 3980 population of these three villages was found to be aged 15 years and above which comprised the study universe.

Study Sample

The prevalence of coronary heart disease as obtained by pilot study on 405 study subject was 4.58%. Using the formula $z^2P(1-P)/d^2$, where relative precision was taken as 15%, sample size was determined which came out to be 3667.

Exclusion criteria: Seriously ill study subjects who were unable to stand erect and study subjects who were unavailable in spite of three informed home visits one week apart were excluded from the

study. Thus out of 3980 study subjects aged 15 years and above, finally 3771 study subjects were included in the study.

Study duration

Duration of the study was from July 2007 to December 2009.

Methodology

Ethical clearance from our Institutional Ethical Committee was obtained. House to house survey was carried out in morning as well as evening hours to get maximum number of study subjects at home. Three visits were made to ensure maximum participation in the study. Those who were absent were asked to be present at the second visit.

The interview technique was used as a tool for data collection. General information and socio-economic details of study subjects were obtained. Detailed history was obtained regarding Coronary heart disease. The WHO ROSE Angina questionnaire¹⁰ was filled for every study subjects. Details were recorded about personal habits like smoking, consumption of smokeless tobacco, alcohol, daily fruits and vegetable consumption and physical activity. Anthropometric indicators like Body Mass Index (BMI) were subsequently calculated and entered in the proforma. ECG was done only on those study subjects who showed affirmative response to WHO ROSE angina questionnaire.¹⁰ General and systemic examination was carried out and findings were recorded.

Statistical Analysis

Data was analyzed using percentage, z test, χ^2 test, and multiple logistic regression analysis with the help of STATA- 8 statistical software.¹²

RESULTS

The present study had seven age categories with a frequency interval of 10 years. It was observed that out of total enrolled 3771 study subjects, the maximum, 1112 (29.5.5%) study subjects belonged to the age group of 15-24 years followed by 921 (24.4%) in the age group of 25-34 years. The mean age of the male and female study subjects was found to be 37.04 \pm 16.28 years and 38.07 \pm 16.57 years respectively. (**Table 1**).

Bivariate analysis showed the variables who were significantly associated with Coronary heart disease was obesity (BMI \geq 25 Kg/m²) [P=0.02, odds ratio=2.1], hypertension [P<0.001, odds ratio=3.86], smoking [P= 0.01, odds ratio= 1.71], smokeless tobacco use [P=0.02, odds ratio= 1.43], sedentary physical activity [P<0.001, odds ratio= 2.65], and age [P<0.001, odds ratio= 6.89]

Table 1: Study subjects enrolled and examined according to age and sex

Age group in years	Males			Females			Total		
	Total	Enrolled	%	Total	Enrolled	%	Total	Enrolled	%
15-24	627	586	93.5	561	526	93.8	1188	1112	93.6
25-34	474	450	94.9	485	471	96.9	959	921	96.0
35-44	392	377	96.2	327	318	98.1	719	695	96.7
45-54	249	233	93.6	187	179	94.2	436	412	94.5
55-64	194	185	95.4	196	181	94.8	390	366	93.8
65-74	126	115	91.3	120	115	96.6	246	230	93.5
>=75	24	18	75.0	18	17	94.4	42	35	83.3
Total	2086	1964	94.2	1894	1807	95.4	3980	3771	94.7

Table 2: Prevalence of CHD* according to age and sex

Age group in years	Males			Females			Total		
	No.	CAD	%	No.	CAD	%	No.	CAD	%
15-24	586	2	0.3	526	2	0.4	1112	4	0.4
25-34	450	14	3.1	471	11	2.3	921	25	2.7
35-44	377	19	5.0	318	13	4.1	695	32	4.6
45-54	233	28	12.0	179	17	9.5	412	45	10.9
55-64	185	28	15.1	217	30	13.8	402	58	14.4
65-74	115	22	19.1	79	22	27.8	194	44	22.7
>=75	18	10	55.6	17	8	47.1	35	18	51.4
Total	1964	123	6.3	1807	103	5.7	3771	226	6.0

* According to ROSE questionnaire.¹⁰ ($\chi^2=0.529$, $df=1$, $P=0.467$)

Table 3: Association of cad with some risk factors

Risk factors for CAD	CAD		Odds Ratio (C.I.)	P-value
	Present (N=169)	Absent (N=3602)		
Obesity (BMI kg/m ²) ≥ 25	22 (13.2%)	239 (6.6%)	2.105(1.25-3.36)	0.02*
Hypertension	66(39.5%)	513(14.2%)	3.86 (2.75-5.38)	<0.001*
Smoking	28(16.5%)	375(10.4%)	1.71 (1.08-2.62)	0.01*
Smokeless tobacco	96(56.8%)	1726(47.9%)	1.43 (1.03-1.98)	0.02*
Alcohol	36(21.3%)	705(19.5%)	1.11 (0.74-1.63)	0.58
Sedentary physical activity	32(18.9%)	292(8.1%)	2.65 (1.71-3.99)	<0.001*
Sex				
Male	96(56.8%)	1868(51.8%)	1.22 (0.88-1.69)	0.29
Female	73(43.2%)	1734(48.2%)		
Fruit & vegetable consumption				
<5 servings	168(99.4%)	3571(99.1%)	1.46 (0.2459.77)	0.71
>=5 servings	1(0.6%)	31(0.9%)		
Age(>45yrs)	119	924	6.89(4.91-9.67)	<0.001*

DISCUSSION

Most of the developing countries of South Asia continue to face major challenge of morbidities and mortality due to rise in incidence of non-communicable like coronary heart disease, hypertension and diabetes mellitus. It has been predicted that CHD will be the single most common cause of mortality in Indian by 2015. Recent studies have shown a high prevalence of CHD in both rural and urban population of India (Kashmir).¹³ Thus, the present study was carried out to find the prevalence of CHD and its known risk factors in people above 15 years in rural area.

In the present, there were total 3980 study subjects out of which 3771 (94.1%) were enrolled in the study; the most common cause for non-enrolment was unavailability.

Present study showed higher prevalence of CHD 6% (based on ROSE angina questionnaire or past history of CHD) than previously reported community based Indian studies. While the prevalence of CHD based on positive ECG finding on subjects having affirmative response to ROSE angina questionnaire was 4.6%.

Kamilli M A et al (2007),¹³ Chow C et al (2007),¹⁴ Singh R B et al (1997 and 1995),^{15,16} Gupta R et al (1997),¹⁷ Rajeev Gupta et al (1995),¹⁸ Kuthy V R et al (1993)¹⁹ reported a lower prevalence of CHD compared to the present study. However Mandal S et al (2009)²⁰ from siliguri reported the prevalence of CHD based on only ROSE questionnaire¹⁰ was 6.6%, which was higher than the present study.

In the present study the males had higher prevalence than the females; however it was not statisti-

cally significant. Similar finding has been reported by Mandal S et al (2009),²⁰ Kamilli M A et al (2007).¹³ Kumar R et al (2006),¹⁹ Singh R B et al (1997)¹⁵ and by Gupta R et al (1995).¹⁷ These Differences of CHD prevalence between men and women are pronounced, especially at younger ages. Women's risk of CHD rises quickly after menopause, resulting in a considerable narrowing of CHD risk between the sexes with age. These data, and other confirmatory data from observational studies, gave rise to the hypothesis that estrogen replacement after menopause would reduce risk in women.²²

Analysis of CHD risk prevalence data shows high prevalence of hypertension, obesity (BMI \geq 25 kg/m²), smoking, smokeless tobacco use, alcohol consumption, sedentary type of physical activity and low consumption of fruits and vegetables in the diet. Statistical analysis has confirmed the importance of classical coronary heart disease risk factors such as Age, hypertension, smoking and sedentary type of physical activity. Similar finding has been reported from various other Indian studies such as by Mandal S et al (2009) carried out a cross-sectional study on a random sample of population aged \geq 40 years old in the Municipal Corporation area of Siliguri, found that the smoking, hypertension and BMI (\geq 25 Kg/m²) were found to be significantly associated with CHD.²⁰

Gupta R (1996) carried out a study on 3397 Indian men (1982 rural, 1415 urban) aged 20 years and above from urban and rural area of Jaipur, found that significant positive associations with sedentary lifestyle 1.47 (1.00-2.25) and smoking 1.30 (1.00-1.80), and obesity 1.42 (0.83-1.32). Inverse association was observed in alcohol intake 0.84 (0.53-1.32).²³

Singh R B et al (1997) carried out a study on 3575 randomly selected study subjects aged 25 years to 64 years from rural and urban area of Moradabad. He observed age, hypertension and smoking was a significant risk factor of coronary disease in men ($P < 0.05$).²⁴

Gupta R et al (1995) also showed the association between CHD and its risk factors like smoking (Odds ratio = 1.33), hypertension (Odds ratio = 1.23).²⁵

CONCLUSION

Risk factors for coronary heart disease which were higher among males were Smoking, smokeless tobacco and alcohol consumption. While hypertension, Obesity (BMI \geq 25kg/m²), sedentary type of physical activity, low fruits and vegetable consumption were the risk factors which were higher

among females. Bivariate analysis showed hypertension, obesity, smoking, smokeless tobacco sedentary type of physical activity and age were significantly associated with coronary heart Disease.

REFERENCES

1. Alberti G. Noncommunicable diseases: tomorrow's pandemics (Editorial). Bull World Health Organ 2001; 79 (10):907.
2. Anand K, Shah B, Gupta V, Khaparde K, Pau E, Menon GR, Kapoor SK. Risk factors for non-communicable disease in urban Haryana: a study using the STEPS approach. Indian Heart J. 2008 Jan-Feb; 60(1):9-18.
3. Aoyagi K, Kusano Y, Takamura N et al. Obesity and cardiovascular risk factors among men and women aged 40 years and older in a rural area of Japan. J Physiol Anthropol 2006; 25(6):371-375. Sited from URL: <http://www.jstage.jst.go.jp/browse/jpa2>.
4. Arvind K, Sandeep G, Hem Lata G et al. Indian journal of Community Medicine 2005; 7(2): 61-63 .
5. Azizi F, Esmeillzadeh A, Mirmirran P. Obesity and cardiovascular disease risk factors in Tehran adults: a population-based study. Eastern Mediterranean Health Journal 2004; 10(6):887-897.
6. Bala D V, Bodiwala ILA N, Patel D D, Shah P M. Epidemiological Determinants of Tobacco Use In Gujarat State, India. Indian Journal of Community Medicine , 2006; 31(3):173-76
7. Bhardwaj R, Kandoria A, Marwah R et al. Prevalence of hypertension in a rural community of North India. Indian Heart J 2005; 57:543-554.
8. Canner PL, Brown PM. Nutrition: Concept and Controversies, 8th edition. USA: Elsevier Publication, 2000.
9. AIIMS. Alcohol consumption in India: a cross sectional study. Mohan D, Anita, Chopara, Dept. of Psychiatry and drug dependence treatment centre, New Delhi. 2000.
10. Rose G A . The diagnosis of Ischemic heart disease and intermittent claudication in field studies. Bulletin world health organization. 1962 ; 27 : 645-658
11. World Health Organization. WHO STEP wise approach to surveillance of non-communicable diseases (STEPS) Non-communicable Diseases and Mental Health, WHO/NMH/CCS/03.01. Geneva: WHO, 2003.
12. Rao KV. Biostatistics: a manual of statistical methods for use in health, nutrition and anthropology, 2nd edition. New Delhi: Jaypee Brothers Medical Publishers, 2007.
13. Kamili MA, Dar IH, Ali G. Prevalence of Coronary Heart Disease in Kashmiris. Indian Heart J 2007; 59: 44-49.
14. Chow C, Cardona M. Cardiovascular disease and risk factors among 345 adults in rural India--the Andhra Pradesh Rural Health Initiative. Int J Cardiol. 2007 Mar 20; 116(2):180-5.
15. Singh RB, Sharma JP. Social class and coronary disease in rural population of north India. The Indian Social Class and Heart Survey. Eur Heart J. 1997 Nov;18(11):1728-35.
16. Gupta R, Prakash H, Gupta VP. Prevalence and determinants of coronary heart disease in a rural population of India. J Clin Epidemiol. 1997 Feb; 50(2):203-9.
17. Gupta R, H Prakash, Mudliyar S et al. Prevalence of coronary heart disease and coronary risk factors in an urban

- population of Rajasthan. *Indian Heart Journal*, 1995; 47:331-338.
18. Singh RB, Niaz MA, Ghosh S et al. Epidemiological study of coronary artery disease and its risk factors in an elderly urban population of north India. *J Am Coll Nutr*. 1995 Dec; 14(6):628-34.
 19. Kutty VR, Balakrishnan KG, Jayasree AK et al. Prevalence of coronary heart disease in the rural population of Thiruvananthapuram district, Kerala, India. *Int J Cardiol*. 1993 Apr; 39(1):59-70.
 20. Mandal S, Saha J B et al. Prevalence of ischemic heart disease among urban population of Siliguri, West Bengal. *Indian journal of Community Medicine*. 2009; 34(1): 19-23.
 21. Kumar R, Megha C S. Urbanization and Coronary Heart Disease: A Study of Urban-Rural Differences in Northern India. *Indian Heart J* 2006; 58: 126-130.
 22. Maxcy Rosenau last. *Public health and Preventive medicine*. 15th edition, Mc Graw Hill Publication 2008.
 23. Gupta R. Lifestyle risk factors and coronary heart disease prevalence in Indian men. *J Assoc Physicians India*. 1996 Oct; 44(10):689-93.
 24. Singh R B, Sharma J P, Rastogi V et al. Social class and coronary disease in a rural population of north India. *European Heart Journal* 1997; 18: 588-595.
 25. Gupt R, Prakash H, Majumdar S et al. Prevalence of Coronary Heart Disease and coronary risk factors in an urban population of Rajasthan. *Indian Heart J* 1995; 47: 331-338.