Prevalence of risk factors for coronary artery disease among adults in a rural area of Tamil Nadu

Jayaramachandran S, Zile Singh, Stalin P, Anil Jacob Purty, Mahendran S

Department of Community Medicine, Mahatma Gandhi Medical College and Research Institute, Puducherry, India

Correspondence to: Jayaramachandran S, E-mail: chandru598@gmail.com

ABSTRACT

Background: Lifestyle changes have increased the epidemic of obesity, diabetes, hypertension (HTN), dyslipidemia, and cardiovascular diseases in the 20th century. In India, the estimated adult prevalence of coronary artery disease (CAD) is increasing which leads to a huge economic loss. **Objectives:** The objective of the study is to measure the prevalence of risk factors for CAD among population aged 30 years and above in a rural area of Tamil Nadu. **Materials and Methods:** A community-based cross-sectional study was done in 16 villages under the field practice area of the Department of Community Medicine, Pondicherry Institute of Medical Sciences. 631 participants were selected by multistaged random sampling and interviewed using modified WHO-STEPS questionnaire. The variables studied were age, sex, socioeconomic status, smoking, alcohol, diet, physical activity, obesity, diabetes, and HTN. Data analysis was done using SPSS version 20. **Results:** Out of 631 participants interviewed in this study, the prevalence of smoking was 13.8%. 29.6% respondents had consumed alcohol once in their lifetime. Almost all the respondents (99.5%) did not consume fruits and vegetables adequately. Majority of the participants consumed salt dense foods and used unsaturated oil for cooking. Only 17.8% were sedentary workers. 32.5% were pre-hypertensives and 25.8% were hypertensives. 28.2% were overweight and 6.6% were obese. **Conclusion:** The prevalence of various risk factors for CAD such as unhealthy diet, obesity, alcohol consumption, and comorbidities was found to be high among our study population. Hence, concerted efforts should be taken by various stakeholders to reduce the risk of developing CAD.

KEY WORDS: Prevalence; Risk Factors; Coronary Artery Disease; STEPS Questionnaire; Adults; Rural; Tamil Nadu

INTRODUCTION

Lifestyles of populations across the world have changed dramatically in the 20th century. Most human societies have moved from agrarian diets and active lives to fast foods and sedentary lifestyle.[1] Cardiovascular disease (CVD) has emerged as the leading cause of death all over India, with coronary artery disease (CAD) affecting Indians at least 6 years earlier than their western counterparts.[2,3] An estimated 17.3 million people died from CVD in 2008, representing 30% of all global deaths. Of these deaths, an estimated 7.3 million were due to CAD.[4] In 2020 AD, 2.6 million Indians are predicted to die due to CAD which constitutes 54.1 % of all CVD deaths. Nearly half of these deaths are likely to occur in young and middle-aged individuals (30–69 years).[5] The risk factors for CAD according to the Framingham Heart Study,[6] INTERHEART study,[7] and Copenhagen City Heart Study[8] are age (>40 years for men and > 45 years for women), male sex, school education <10 years, low or middle income, family history of CAD, low fruits and vegetable intake, hypercholesterolemia, smoking, heavy

alcohol intake, psychological stress, physical inactivity, hypertension (HTN), diabetes mellitus (DM), and obesity. The risk factors of CAD, if identified at an early stage, can be extremely useful in planning primary and secondary preventive strategies for CAD and its complications. A major chunk of government resources can be saved which would otherwise be spent for investigation and treatment of patients with CAD and its complications. However, detailed assessment of multiple risk factors in the same community has not been done, and there are only few studies on the prevalence of individual risk factors for CAD such as HTN and obesity from Tamil Nadu. This study will address a phenomenon of interest to preventive cardiology since it would give the prevalence of significant major risk factors for CAD in population aged 30 years and above in a rural area of Viluppuram, Tamil Nadu.

MATERIALS AND METHODS

A community-based cross-sectional study was done in the 16 villages under the field practice area of Rural Health Centre, Anachikuppam, Viluppuram, Tamil Nadu, under the Department of Community Medicine, Pondicherry Institute of Medical Sciences, Puducherry. All persons aged 30 years and above who were resident for 1 year and above were included in the study. 631 participants were selected from the study population of around 16,000 by multistaged random sampling and studied. Modified WHO-STEPS questionnaire[9] was used to interview the study participants. It consists of study variables on sociodemographic, tobacco smoking/chewing, alcohol intake, dietary pattern, physical activity, HTN, diabetes (self-reported), height, weight, hip circumference, and waist circumference (WC).[10] Instruments used were stadiometer, automated BP machine (Omron MX3), and standard non-stretchable Inch tape, and the measurements were made using standardized techniques. Standard operational definition was used in this study for current smoker/alcoholic, unhealthy diet, obesity, and HTN.[10-16] The data were analyzed using the Statistical Package for the Social Sciences, version 20.0. Participant information sheet was provided to all the participants, and informed written consent was obtained from all the participants. All participants identified with risk factor were advised and referred to the nearest health facility. This study was conducted after obtaining ethical clearance from the PIMS Institute Ethics Committee, Puducherry.

RESULTS

Table 1 shows the sociodemographic profile of the study population. Of 631, 54.8% were females and 45.2% were males aged 30 years and above. Maximum participants (40.4%) were in the age group of 30–39 years. Maximum participants (38.3%) were illiterates. However, 58.8%

Table 1: Sociodemographic profile of the study participants (*n*=631)

Risk factors	No. of participants *n* (%)
Age (in years)	
30–39	255 (40.4)
40–49	156 (24.7)
50–59	113 (17.9)
60–69	69 (11.0)
70 and above	38 (6.0)
Sex	
Male	285 (45.2)
Female	346 (54.8)
Education	
Illiterate	242 (38.3)
Primary	222 (35.2)
Middle	128 (20.3)
Higher secondary	21 (3.3)
Graduate	10 (1.6)
Post-graduate	8 (1.3)
Occupation	
Un-employed	279 (44.2)
Unskilled	264 (41.8)
Skilled	71 (11.3)
Business	10 (1.6)
Professional	7 (1.1)
Caste	
Scheduled caste	195 (30.9)
Scheduled tribe	2 (0.3)
Other backward caste	223 (35.3)
Most backward caste	211 (33.5)
Socio-economic status	
Upper class	8 (1.3)
Upper middle class	17 (2.7)
Middle class	77 (12.2)
Lower middle class	237 (37.5)
Lower class	292 (46.3)

had schooling ranging from primary to higher secondary. Maximum respondents (44.2%) were unemployed and 41.8% were unskilled workers. Maximum participants (46.3%) belong to lower class. Maximum participants (35.3%) belong to other backward caste.

Table 2 shows the prevalence of risk factors for CAD among the study population. Among the smokers, majority of them (60.9%) smoked beedies. Majority (68.4%) of the smokeless tobacco users were females, and the most common type of smokeless tobacco consumed was khaini (78%) followed by betel quid (22%). The prevalence of exposure to second-hand smoke was 23.6%, and the exposure was predominantly at workplaces among

Table 2: Prevalence of risk factors for CAD (*n*=631)

Risk factor	Prevalence *n* (%)
Tobacco use	
Smoking (current)	87 (13.8)
Smokeless form (current)	168 (26.6)
Alcohol consumption	
Ever alcohol intake (at least once in life time)	187 (29.6)
Alcoholic (past 12 months)	168 (25.0)
High risk drinker (>5 standard drink)	102 (16.2)
Unhealthy diet	
Intake of salt dense foods (papad/dry fish/pickle/etc.)	490 (77.7)
Intake of foods rich in trans-fat (fried items)	338 (53.6)
High salt intake (>5 g/day)	626 (99.2)
Low fruit (<5 servings/day)	628 (99.5)
Low vegetables (<5 servings/day)	628 (99.5)
Saturated oil intake	269 (42.6)
Physical activity	
Strenuous work	187 (29.6)
Moderate work	480 (76.1)
Sedentary work	112 (17.7)
Walking/cycling	546 (86.5)
Comorbidities	
High blood sugar	52 (8.2)
Family h/o HTN/DM/CAD/stroke	143 (22.7)
Pre-hypertensives (BP>120/80–<139/89 mmHg)	205 (32.5)
Hypertensives (BP>140/90 mmHg)	163 (25.8)
Anthropometry	
Over weight (BMI>25 and<30 kg/m^2)	177 (28.2)
Obesity (BMI>30 kg/m^2)	42 (6.6)
Central obesity (WC: Increased risk)	345 (54.7)
Central obesity (WC: Substantially increased risk)	163 (25.8)
WHR (M>0.90 and F>0.85)	473 (75.0)

CAD: Coronary artery disease, DM: Diabetes mellitus, BMI: Body mass index, BP: Blood pressure, HTN: Hypertension, WC: Waist circumference

the males and at home among the females. Most of the alcoholics 98.9% were males. 43.3% of them started consuming alcohol in the age group of 21–30 years. Out of 137 respondents, there were 86.7% current alcoholics and 76.6% were recent alcoholics. 73.2% and 98.4% respondents consumed fruits and vegetables, respectively. However, the consumption of fruits and vegetables by almost all the respondents (99.5%) was less. 85.1% used unsaturated oil for cooking. However, about 30% of the respondents consume both saturated and unsaturated oil for cooking and 53.6% consumed snacks rich in trans-fat. Almost all the participants have consumed salt and oil more than the level recommended by the WHO. 49% respondents had got their blood pressure (BP) checked by a doctor. Of whom, 24.3% had HTN. However, checking

of BP at the time of interview revealed that 41.7% had normal BP, 32.5% were pre-hypertensives, and 25.8% were hypertensives. 24.1% of the respondents had got their blood sugar level checked, of which 34.2% were found to be diabetics and 78.8% were on oral hypoglycemic drugs for the past 1 year. Majority of the respondents (53.2%) had normal body mass index. However, 28.2% were overweight and 6.6% were obese. 25.8% respondents had substantially increased risk of CAD due to increased WC.

DISCUSSION

The prevalence of risk factors for CAD such as harmful consumption of alcohol, unhealthy diet, obesity, and HTN among population aged 30 years and above in our field practice area was found to be high. Out of 631 respondents, majority of the study participants (54.8%) were females. This was due to the fact that males were not available at home even after three visits. The mean age of the study participants was almost similar to the study done by Raghuvanshi[17] in urban and rural India of three different states in 2011 (mean age 45.99 years with standard deviation ± 12.09). Maximum participants (38.3%) were illiterates, 44.2% were unemployed, and 41% belong to lower middle class. The high percentage of illiterates, unemployment, and belonging to lower SES respondents could be due to the fact that our study population belongs to rural coastal area of Tamil Nadu. The prevalence of smoking was 13.8% which was more or less similar to the study done by Chockalingam *et al.*[18] (14.3%), in rural area of Chennai in 2009–2011. The prevalence of smoking was higher (30.2%) among males when compared to females (0.3%). However, the prevalence of smokeless tobacco was higher among females (33.2%) when compared to males (18.6%). These findings were similar to Sinha *et al.*,[19] who had compared the prevalence of tobacco use among males and females of three countries of WHO – SEAR, namely Thailand, Bangladesh, and India in 2010 among adults. The prevalence of second-hand smoke among the study participants was 23.6%. Males were exposed more in outdoor and females to indoor second-hand smoke which may be due to the fact that most of the males go out on various vocations and females remain at home doing household activities. The prevalence of current alcohol consumers was 25% which almost corresponds to the ICMR: IDSP-NCD risk factor survey[12] showing 30% of participants as current alcohol consumers in 2004. Of 158 alcoholics, majority (86.7%) of them were current alcoholics who were similar to the ICMR: IDSP-NCD risk factor survey[15] done in urban and rural areas of seven states of India in 2004. The consumption of fruits and vegetables was inadequate by almost all the respondents (99.5%), which correspond to the finding of the ICMR: IDSP-NCD risk factor survey[12] showing that 99.0% had inadequate intake of fruits and vegetables. However, lower prevalence of inadequate fruit and vegetable intake (40.3%) was noted in

a study done in Trivandrum, Kerala, by Thankappan *et al.*[20] which might be due to higher SES and literacy rate among their participants. The high prevalence of unhealthy dietary practices may be due to the fact most of them (38.3%) were illiterates and hence may not be aware of the harmful effects on health due to unhealthy dietary habits. In our study, the prevalence of sedentary lifestyle was 17.8% which was much lower (59.2%) than that of Mahajan *et al.*[21] study done in rural Delhi. The prevalence of DM was 8.2% in our study which was almost similar to a study done by Mahajan *et al.*[21] (6.6%) done in rural Delhi. 22.7% had positive family history of either HTN or DM or CAD or stroke which was higher than a study done from January 2010 to December 2011 by Raghuvanshi *et al.*[17] (17.7%). The prevalence of overweight was 28.2% which corresponds to a study done in three different states by Raghuvanshi *et al.*[17] The prevalence of obesity in our study was 6.6% which was almost similar to other studies done in rural Delhi by Mahajan *et al.*[21] (7.8%) and Raghuvanshi[17] (6.1%). The prevalence of HTN in our study was 25.8% which was higher than a study done by Chow *et al.*[22] (20.3%) in two rural villages of Andhra Pradesh. The risk of developing CAD was more prevalent in females than males. The prevalence of truncal obesity was 54.7% which was almost similar to the study done by Mahajan *et al.*[21] (51.8%) in rural Delhi. Females were at more risk of developing CAD when compared to males considering WC as per the WHO standards. This may be due to change in lifestyle patterns of respondents during the last decade.

Most of the risk factors for CAD were studied using modified WHO-STEPS questionnaire with standard operational definitions which allows comparison by other researchers. Recall bias might have occurred while documenting the details related to frequency and amount of consumption of certain risk factors. Hence, the results of these variables should be interpreted with caution.

CONCLUSION

The prevalence of risk factors for CAD such as unhealthy diet, obesity, alcohol consumption, and comorbidities was high among our study population. Hence, concerted efforts should be made to create awareness about healthy lifestyle. All individuals >30 years of age should be screened for the risk factors for CAD.

REFERENCES

1. Prabhakaran D, Yusuf S. Cardiovascular disease in India: Lessons learnt and amp; Challenges ahead. Indian J Med Res 2010;132:529-30.
2. Xavier D, Pais P, Devereaux PJ, Xie C, Prabhakaran D, Reddy KS, *et al.* Treatment and outcomes of acute coronary syndromes in India (CREATE): A prospective analysis of registry data. Lancet 2008;371:1435-42.
3. Prabhakaran D, Yusuf S, Mehta S, Pogue J, Avezum A, Budaj A, *et al.* Two-year outcomes in patients admitted with non-ST elevation acute coronary syndrome: Results of the OASIS registry 1 and 2. Indian Heart J 2005;57:217-25.
4. Gupta R, Joshi P, Mohan V, Reddy KS, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. Heart 2008;94:16-26.
5. Ajay VS, Gupta R, Panniyammakkal J, Chaturvedi V, Prabhakaran D, Reddy KS. National Cardiovascular Disease Database. Report No.: SE/04/233208. New Delhi: Ministry of Health and Family Welfare; 2002.
6. Torpy JM, Burke AE, Glass RM. Coronary heart disease risk factors. J Am Med Assoc 2009;302:2388.
7. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, *et al.* Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): Case-control study. Lancet 2004;364:937-52.
8. Schnohr P, Jensen JS, Scharling H, Nordestgaard BG. Coronary heart disease risk factors ranked by importance for the individual and community. A 21 year follow-up of 12 000 men and women from the Copenhagen city heart study. Eur Heart J 2002;23:620-6.
9. World Health Organization. Chronic Disease and Health Promotion: The WHO STEP wise Approach to Chronic Disease Risk Factor Surveillance. Available from: http://www. who.int/chp/steps. [Last assessed on 2013 Oct 03].
10. World Health Organization. Waist Circumference and waist-hip Ratio: Report of a WHO Expert Consultation. Geneva: World Health Organization; 2008. p. 8-11.
11. Dudala SR, Arlappa N. An updated Prasad's socio economic status classification for 2013. Int J Res Dev Health 2013;1:26-8.
12. National Institute of Medical Statistics. Indian Council of Medical Research (ICMR), 2009, IDSP Non-Communicable Disease Risk Factors Survey, Phase-I States of India; 2007-08.
13. World Health Organization. Diet, Nutrition and the Prevention of Chronic Diseases. Technical Report Series No. 797. Geneva, Switzerland: WHO; 1990.
14. WHO/FAO. Diet, Nutrition and the Prevention of Chronic Diseases. Report of a Joint WHO/FAO Expert Consultation. Geneva, Switzerland: WHO; 2003.
15. Global Database on Body Mass Index. World Health Organization. Available from: http://www.apps.who.int/ bmi/index.jsp?introPage=intro_3.html. [Last assessed on 2013 Oct 03].
16. Jeffery L. Martin. Hypertension guidelines: Revisiting the JNC7 recommendations. J Lanc Gen Hosp 2008;3:91-7.
17. Raghuvanshi VP. Study on healthy lifestyle behaviour and cardiovascular mortality among urban and rural populations in India. Int J Life Sci Biotechnol Pharm Res 2013;2:175-82.
18. Chockalingam K, Vedhachalam C, Rangasamy S, Sekar G, Adinarayanan S, Swaminathan S, *et al.* Prevalence of tobacco use in urban, semi urban and rural areas in and around Chennai city, India. PLoS One 2013;8:e76005.
19. Sinha DN, Palipudi KM, Rolle I, Asma S, Rinchen S. Tobacco use among youth and adults in member countries of South-East Asia region: Review of findings from surveys under the global tobacco surveillance system. Indian J Public Health 2011;3:169-76.

20. Thankappan KR, Sivasankaran S, Sarma PS, Mini G, Khader SA, Padmanabhan P, *et al.* Prevalence-correlates-awareness-treatment and control of hypertension in Kumarakom, Kerala: Baseline results of a community-based intervention program. Indian Heart J 2006;58:28-33.

21. Mahajan H, Dohare S, Lal P, Saha R, Khan SM, Chauhan H. Emerging importance of coronary artery disease risk factors in India: A population based study. Indian J Public Health Res Dev 2013;13:105-9.

22. Chow C, Cardona M, Raju PK, Iyengar S, Sukumar A, Raju R, *et al.* Cardiovascular disease and risk factors among 345 adults in rural India the Andhra Pradesh rural health initiative. Int J Cardiol 2007;116:180-5.

How to cite this article: Jayaramachandran S, Singh Z, Stalin P, Purty AJ, Mahendran S. Prevalence of risk factors for coronary artery disease among adults in a rural area of Tamil Nadu. Int J Med Sci Public Health 2019;8(6):473-477.

Source of Support: Nil, **Conflict of Interest:** None declared.