# Prevalence Of Risk Factors For Coronory Artery Disease In Rural Population In North India A Cross Sectional Study

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**ABSTRACT**
**Objective:** The objective of the study to access the prevalence of risk factors for coronary artery disease in rural population lives in north India.
Methods: This study design was community based cross sectional study, we selected 1078 residents by simple random sampling aged between 20 years to 60 years. Total no of adults satisfying inclusion criteria was approximately 3800 sampling frame was prepared, with the help of standard random number table 1078 participants were identified. A total of 980 individuals participate in the study. A questionnaire was prepared based on WHO STEP wise approach for CAD Surveillance.[1] Data was collected from the participants through interview. Data regarding socio demographic variables like age, sex, address, educational status, main work status (occupation), marital status, socio-economic status were collected.
**Results:** The study reveals that the overall prevalence of smocking was 10.9%. The prevalence of smokeless tobacco was 37.5%. alcohol was consumed by 21.4% participants. Prevalence of hypertension was 20.2%. the diabetes was prevalent in 6.3%. the prevalence of obesity was 7.0%. hypertension present in 26.6% of subjects. Total 36% of participants was having high triglyceride level. Prevalence of high cholesterol level was 15%.
Conclusion: the study demonstrates that in rural population the prevalence of CAD risk factors was high. There is an immediate need to raise awareness to put down these risk factors so that our rural population be aware about these risk factors.
**Keywords:** coronary risk factors, coronary artery disease, rural, north India

## INTRODUCTION

Cardiovascular diseases which include Coronary Artery Disease (CAD) and stroke account for the large proportion of all premature deaths and disability worldwide. They are responsible for 60% of all deaths and 47% of burden of diseases.[2] The Global Burden of Disease (GBD) study reported that in India in year 2000, a total number of deaths due to CVD's were 3.1million and that due to CAD was 1.6 million. It has been predicted that by 2020, there would be 111% increase in CVD death in India. This increase is much more than 77% for china, 106% for other Asian countries and 15% for economically developed countries.

The CAD has assumed the 'epidemic' proportion in India and many other developing countries. The prevalence rates can be estimated from several studies over the past several decades which have ranged from 1.6% to 7.4% in rural population and 1% to 13.2% in urban population.[3]Though the disease is more prevalent in urban population it is progressively increasing in rural population in terms of absolute numbers, the burden of CAD in these subjects is large. The disease occurs at younger age in rural subjects as compared to those in urban populations which deserves a special attention.[4]

The term "Risk Factor" specifically for CAD was used first time in Framingham Study, which refers to an attribute or characteristic or exposure of an individual whose presence or absence raises the probability of an adverse outcome.[5] The majority of the 32 million individuals who develop heart attacks and strokes every year have one or more cardiovascular risk factors. Most of these

cardiovascular events (CVE) are preventable if meaningful action is taken against the risk factors.[6] Early detection of CAD risk factors and appropriate intervention reduces the mortality by 35 – 60%.[7] According to a WHO report, the impact of many of the risk factors can be reversed quickly, and most benefits will accrue within a decade. Even modest changes in risk factor levels could bring about large benefits.[8]

There is a strong positive correlation of increase in CAD in rural subjects with primordial risk factors of faulty diet, tobacco consumption, and sedentary lifestyle.[9] Major coronary risk factors – high blood pressure, high cholesterol levels and diabetes are also found to be escalating in rural population and correlate positively with the increase in CAD and most often have more than one CAD risk factor. These risk factors are interrelated so much so that occurrence of one risk factor paves the way for the other and moderate elevation of any risk factors have multiplicative effect, there by leading to the development of CAD. It is therefore necessary to take into account the overall risk of an individual in order to predict the future incidence of CAD. Risk prediction charts have been developed using simple variables so that they can be applied even in low resource-settings.

Retrospective analysis of Indian CAD burden and risk factors studies show increasing prevalence in both urban and rural population. The policy makers and health planners do not have sufficient data on the risk factors of CAD in the country, due to paucity of population based studies.

Studies on prevalence of risk factors for CAD are routinely carried in developed countries. However few studies on prevalence of risk factors have been carried out in India but mainly for urban population. Hence a community based study on the prevalence of risk factors for coronary artery disease among adults residing in rural field practice area was taken up. The results of this study will provide necessary inputs to categorize patients with risk factors and to predict the incidence of CAD in the next 10 years for those aged 40 years and above. Also pave the way for health education for lifestyle modification to those with more than two modifiable risk factors or those who have the chances of developing CAD in next 10 years.

## METHODOLOGY

Design: The study design was community based cross - sectional study

Duration: One year

Participants: Adults aged between 20 years to 60 years

**Selection criteria-**

*Inclusion*

Adults aged between 20 years to 60 years.

Residents of the study area and who were staying in that area for at least one year.

*Exclusion*

Persons already diagnosed with Coronary Artery Disease (Myocardial Infarction, Angina, Heart failure) in the past.

Sample size: The required sample size is calculated using the formula: $N = 4\ p\ q\ /\ d^2$

Where, N → sample size

p → prevalence of overweight (one of the risk factors for CAD)

q → (p – 100)

d → absolute error.

By taking prevalence of overweight as 11%[10], and absolute error as 2 % the sample size obtained was 978 approximated to 980. Considering 10% drop outs from the study, the total sample size obtained was 1078.

**Sampling method:** Simple random sampling.
**Sampling procedure:** Adults aged between 20 years to 60 years. Total numbers of adults satisfying the inclusion criteria were approximately 3800. Sampling frame was prepared. With the help of standard random number table, 1078 participants were identified. A total of 980 individuals participated in the study.
**Statistical analysis:** The data was tabulated and master chart was prepared Data collected in the questionnaire was coded and entered in Microsoft excel sheet. Data was analyzed using Statistical Package for Social Sciences (SPSS), version 16.0 and the prevalence of each risk factor was expressed in terms of percentages. Statistical analysis was done using Pearson's Chi- Square test to find out the association between demographic variables and risk factors of CAD. A probability value (P value) of less than 0.05 was considered as significant.
Ethical Clearance The study was approved from Institutional Ethics Committee

**Results:** A Total of 980 participants included in the study, 234 (23.88%) participants were between age group of 20 – 29 years, 250 (25.51%) between 30 to 39 years, 262 (26.73%) between 40 to 49 years and 234 (23.88%) were more than or equal to 50 years.
**Table 1(a):** Association between age and risk factors for CAD (N = 980)

| Age group in years | No. | Smoking (%) | Tobacco use (%) | Alcohol use (%) | Sedentary at work (%) | Sedentary during Leisure (%) | Sedentary during Travel (%) |
|---|---|---|---|---|---|---|---|
| 20 – 29 | 234 | 22 (9.4) | 54 (23.1) | 37 (15.8) | 45 (19.2) | 140 (59.8) | 86 (36.8) |
| 30 – 39 | 250 | 24 (9.6) | 87 (34.8) | 63 (25.2) | 41(16.4) | 105 (42.0) | 47 (18.8) |
| 40 – 49 | 262 | 28 (10.7) | 105 (40.1) | 68 (26.0) | 46 (17.6) | 110 (42.0) | 50 (19.1) |
| ≥ 50 | 234 | 33 (14.1) | 104 (44.4) | 42 (17.9) | 47 (20.1) | 139 (59.4) | 40 (17.1) |
| Total | 980 | 107 (10.7) | 350 (35.7) | 210 (21.4) | 179 (18.3) | 494 (50.4) | 223 (22.8) |
| $X^2$ value<br>Degrees of freedom<br>P value | | 3.454<br>3<br>0.327 | 26.307<br>3<br>< 0.0001 | 11.366<br>3<br>0.010 | 1.336<br>3<br>0.721 | 30.386<br>3<br>< 0.0001 | 34.582<br>3<br>< 0.0001 |

**Table 1(b):** Association between age and risk factors for CAD (N = 980)

| Educational status | Number | Self reported Hypertension (%) | Self reported Diabetes (%) | Over weight (%) | Obese (%) |
|---|---|---|---|---|---|
| No formal education | 279 | 83 (29.7) | 19 (6.8) | 79 (28.3) | 18 (6.5) |
| Primary | 137 | 35 (25.5) | 17 (12.4) | 33 (24.1) | 19 (13.9) |
| Higher primary | 134 | 22 (16.4) | 07 (5.2) | 37 (27.6) | 05 (3.7) |
| High school | 282 | 38 (13.5) | 12 (4.3) | 75 (26.6) | 19 (6.7) |
| College / graduate | 148 | 20 (13.5) | 07 (4.7) | 37 (25.0) | 08 (5.4) |
| Total | 980 | 198 (20.2) | 62 (6.3) | 261 (26.6) | 69 (7.0) |
| $\chi^2$ value | | 31.413 | 11.615 | 13.501 | |
| Degrees of freedom | | 4 | 4 | 8 | |
| P value | | < 0.0001 | 0.020 | 0.096 | |

**Table 1 (c):** Association between age and risk factors for CAD (N = 980)

| Age group in years | Number | Systolic hypertension (%) | Diastolic hypertension (%) | WC category (%) | WHR category (%) |
|---|---|---|---|---|---|
| 20 – 29 | 234 | 17 (7.3) | 23 (9.8) | 47 (20.1) | 145 (62.0) |
| 30 – 39 | 250 | 48 (19.2) | 61 (24.4) | 69 (27.6) | 145 (58.0) |
| 40 – 49 | 262 | 88 (33.6) | 98 (37.4) | 139 (53.1) | 201(76.6) |
| ≥ 50 | 234 | 108 (46.2) | 102 (43.6) | 116 (49.6) | 187 (79.9) |
| Total | 980 | 261 (26.6) | 284 (29.0) | 371 (37.9) | 678 (69.2) |

| | | | | |
|---|---|---|---|---|
| $\chi^2$ value | 104.112 | 77.549 | 81.965 | 39.998 |
| Degrees of freedom | 3 | 3 | 3 | 3 |
| P value | < 0.0001 | < 0.0001 | < 0.0001 | < 0.0001 |

The parameters for calculating risk factors given in table 2

**Table 2** Definitions for the different risk factors in the study

| Risk factor | Definition |
|---|---|
| Hypertension | Systolic BP ≥140 mm Hg and/or diastolic BP ≥90 mm Hg during the visit and/or presence of anti-hypertensive drug treatment; considered known if the subject was aware of this condition |
| Diabetes mellitus | FPG ≥126 mg/dL and/or PPPG ≥200 mg/dL at the time of investigation and/or presence of anti-diabetic drug treatment; considered known if the subject was aware of this condition |
| Obesity | BMI ≥30 kg/m$^2$ |
| Overweight | BMI ≥25 kg/m$^2$ |
| Hypercholesterolaemia | Total blood cholesterol ≥200 mg/dL |
| Decreased HDL cholesterol | ≤40 mg/dL |
| Adverse total cholesterol/HDL ratio (dyslipidemia) | ≥4.5 |
| Age | >45 years in men and >55 years in women |
| Sex | Male sex |
| Family history of CAD | Premature CAD in first degree relatives (<55 years in men and <65 years in women) |
| Risk factors for CAD | Age, sex, family history, diabetes mellitus, smoking, dyslipidemia, hypertension and obesity |

BMI, body mass index; CAD, coronary artery disease; FPG, fasting plasma glucose; HDL, high density lipoprotein; PPPG, post-prandial plasma glucose

In our study 10.9% of the participants smoked tobacco. Among men the prevalence of smoking was higher (22.0%) compared with women (0.4%) (P < 0.0001). The mean age of initiation of smoking among smokers was 22.15 ± 5.9 years with a range of 14 to 45 years. The youngest age of onset of smoking noted was 14 years. The average duration of smoking among smokers was 18.4 ± 10.31 years with a range of 1 to 42 years, among the smokers most of the subjects were daily smokers, 04 (3.7%) were occasional and 05 (4.8%) were past smokers. Overall 'Beedi' was the predominant form consumed by 53.3% of smokers followed by 'Cigarette' 46.7% of them.

In the present study, (35.7%) used smokeless tobacco. Among men the prevalence of use was 46.7% and among women it was 25.3%. The difference was statistically significant (P < 0.0001). The mean age of initiation of smoking among smokers was 22.4 ± 7.01 years with a range of 7 to 50 years. The youngest age of smokeless tobacco use noted was 7 years. The average year of consumption of

smokeless tobacco among users was 18.9 ± 9.47 years with a range of 1 to 45 years. among the users of smokeless tobacco, most of the subjects were daily users. 92.8% of men and 78.0% of women used it daily; 3.2% of men and 15.7% of women used it occasionally. About 4.9% of them were past users. Majority of them i.e., 64.3% of the participants did not consume tobacco. Overall 'Chewing tobacco' was the predominant form of consumption i.e., 66.0% followed by 'Gutka' i.e., 30.6%.

The overall prevalence of alcohol use was 21.4%. Among men 41.8% of them consumed it as compared to women 2.0%. This difference was statistically significant (P < 0.0001). Among alcoholics, 'whisky was the predominant type of drink consumed 96 (45.7%) followed by 'brandy' 63 (30.0%), 'beer' 23 (11.0%), 'rum' 19 (9.0%) and others 09 (4.3%). 'Whisky' was the predominant type of drink consumed among men (47.0%) whereas 'brandy' was the predominant type among women (60.0%). Among the alcoholics 60.0%

Baseline demographic and behavioural characteristics of the participents

| Marital status | | |
|---|---|---|
| | Total | % |
| Married | 865 | 88.2 |
| Unmarried | 82 | 8.4 |
| Widow / Divorced | 33 | 3.4 |
| Total | 980 | 100 |
| Family history of CAD | | |
| No history | 823 | 90.1 |
| Father | 73 | 7.5 |
| Mother | 22 | 2.2 |
| Both parents | 02 | 0.2 |
| Total | 980 | 100 |
| Smocking | | |
| Yes | 107 | 10.9 |
| No | 873 | 89.1 |
| Alcohol | | |
| Yes | 210 | 21.4 |
| No | 770 | 78.6 |
| Physical activity | | |
| Sedentary | 179 | 18.3 |
| Moderate | 548 | 55.9 |
| Vigorous | 253 | 25.8 |
| BMI | | |
| Underweight | 101 | 10.3 |
| Normal | 549 | 56.0 |
| Overweight | 261 | 26.7 |
| Obese | 69 | 7.0 |
| | | |

consumed it 1 to 4 days a week, 19.5% consumed it more than or equal to 5 days per week; 16.7% consumed occasionally i.e., 1 to 3 days per month and 3.8% consumed less than once per month.

The overall prevalence of self reported hypertension in our study was 20.2%. The prevalence among women was higher (22.9%) compared to men (17.4%). This difference was found to be statistically significant (P = 0.031). The overall prevalence of self reported history of diabetes mellitus in our study was 6.3%. The prevalence among men was higher (7.9%) compared to women (4.8%). This difference was found to be statistically significant (P = 0.042). In the present study the overall

prevalence of overweight and obesity were 26.7% and 7.0% respectively. The prevalence of overweight was more among men compared to women (31.8% vs. 21.7%); whereas among obese, women outnumbered men (10.3% vs. 3.5%). This difference was statistically significant (P< 0.0001). In the present study, the overall prevalence of abdominal obesity based on waist circumference criteria was 37.9%. The prevalence among women was double than that of men (52.0% vs. 23.0%). The difference was statistically significant (P < 0.0001). the overall prevalence of abdominal obesity based on waist: hip ratio criteria was 69.2%. The prevalence among women was significantly high than that of men (96.0% vs. 41.0%). The difference was statistically significant (P < 0.0001).

The overall prevalence of hypertension was 26.6%; grade I and grade II being 19.7% and 6.9% respectively. Systolic hypertension prevalence was higher in males (27.8%) as compared to females (25.5%).

The overall prevalence of pre-hypertension was 43.1%; prevalence was more among males (47.3%) as compared to females (39.0%).

This gender wise difference in systolic blood pressure level was found statistically significant (P = 0.004). study the prevalence of hypertension was 29.0%; grade I and grade II being 21.5% and 7.5% respectively. Diastolic hypertension prevalence was higher in males (30.4%) as compared to females (27.7%). The overall prevalence of pre-hypertension was 28.7%; prevalence was more among males (30.3%) as compared to females (27.1%). In our study, 22.8% of the participants were free from any of the risk factors for CAD, 503 (51.3%) had 1 – 2 risk factors and 254 (25.9%) had 3 or more risk factors for CAD. 757 (77.2%) had at least one or more risk factors.

Participants who were subjected to fasting blood sugar examination 67.0% had normal blood glucose; 16.0% had impaired fasting glucose levels and 17.0% were having high fasting blood sugar levels. This difference was statistically significant when compared with the risk categories (P = 0.017).

Among the participants having impaired fasting glucose levels only 04 (25.0%) were known case of DM. Among the participants who had high fasting blood sugar levels only 06 (35.3%) were known case of DM.

The mean ± SD values of FBS was found to be increasing with the number of risk factors i.e., 101.0 ± 25.2 in no risk category, 103.4 ± 20.1 in 1 to 2 risk category and 128.1 ± 64.6 in more than or equal to 3 risk factor categories.

study participants who were subjected to fasting total cholesterol examination 85.0% had normal cholesterol levels and 15.0% had high cholesterol levels. This difference was statistically significant when compared with the risk categories (P = 0.023).

The mean ± SD values of TC was found to be increasing with the number of risk factors i.e., 160.2 ± 73.4 in no risk category, 171.9 ± 28.4 in 1 to 2 risk category and 183.8 ± 28.2 in more than or equal to 3 risk factor categories.

participants who were subjected to fasting triglyceride level examination 64.0% had normal triglyceride levels and 36.0% had high triglyceride levels. This difference was statistically significant when compared with the risk categories (P = 0.020). The mean ± SD values of TGL was found to be increasing with the number of risk factors i.e., 128.7 ± 71.9 in no risk category, 138.5 ± 52.1 in 1 to 2 risk category and 163.2 ± 63.0 in more than or equal to 3 risk factor categories. participants who were subjected to fasting HDL cholesterol examination 85.0% had normal HDL cholesterol levels and 15.0% had high cholesterol levels. However, this difference was not statistically significant when compared with the risk categories (P = 0.133). The mean ± SD values of HDL was found to be decreasing with the number of risk factors i.e., 45.7 ± 4.1 in no risk category, 42.8 ± 3.3 in 1 to 2 risk category and 41.6 ± 3.4 in more than or equal to 3 risk factor categories. our study 496 (50.6%) had some risk of fatal or non-fatal cardio vascular event in their near future decade. Based on the WHO / ISH risk prediction chart category; majority i.e., 327 (33.4%) had < 10% risk; 72

(7.3%) had 10 – 19% risk; 38 (3.9%) had 20 – 29 % risk; 22 (2.2%) had 30 – 39% risk and 37 (3.8%) had ≥40% risk of fatal or non-fatal cardio vascular event in next 10 years. Among the gender, women had significant higher risk of CAD as compared to men in near future decade (P <0.0001).

Table 2: Prediction of 10 year risk of fatal or non fatal cardiovascular event among the participants (N = 980)

| Risk Prediction Categories | Men (%) | Women (%) | Total (%) |
|---|---|---|---|
| Not assessed* | 273 (57.1) | 211 (42.0) | 484 (49.4) |
| < 10 % risk | 133 (27.8) | 194 (38.6) | 327 (33.4) |
| 10 – 19 % risk | 31 (6.5) | 41 (8.2) | 72 (7.3) |
| 20 – 29 % risk | 14 (2.9) | 24 (4.8) | 38 (3.9) |
| 30 – 39 % risk | 13 (2.7) | 9 (1.8) | 22 (2.2) |
| ≥ 40 % risk | 14 (2.9) | 23 (4.6) | 37 (3.8) |
| Total | 478 (100) | 502 (100) | 980 (100) |
| $\chi^2 = 25.686$ Df = 5 P < 0.0001 | | | |

**DISCUSSION:**

this study was conducted at F.H. Medical college Agra in medicine department during the period January 2019 to December 2019. In the present study, 48.8% were men with mean age 38.2 ± 10.66 years and 51.2% were women with mean age 40.4 ± 11.32 years. Maximum numbers (33.9%) of male participants were in age group of 30 – 39 years and minimum (18.4%) in ≥ 50 years age group. Maximum numbers of female participants were (29.1%) in the age group of ≥ 50 years and minimum (17.5%) were in 30 – 39 years age group. Two studies conducted in rural area of Faridabad and Delhi districts of North India showed that, the proportion of women was higher (52.0%; 62.5%) as compared to men (48.0%; 37.5%).[11] Similar to our study, a study conducted at Mukim Dengkil, Malaysia showed that, participants aged 30 – 39 years were 20.7% and ≥ 50 years were 15.8% with higher proportion of women.[12]

In the present study, the prevalence of smoking tobacco was 10.9% with significantly high proportion among men (22.0%) compared to women (0.4%). Other studies conducted at Delhi and Kancheepuram districts revealed a higher prevalence of smoking compared to our study i.e., 17.6% and 29.4% respectively.[11, 13] The mean age of onset of smoking and average duration of smoking was comparable to other studies. Daily smokers were significantly higher in our study and only two women reported to be current smokers; in other studies none of the females were smokers.[11,13] Although a higher proportion of smoking was observed among men, it is well below the national

average according to NFHS – III estimate for rural area i.e., 35.0% and 1.8% among men and women respectively.[14]

In our study the prevalence of use of smokeless tobacco (35.7%) and was considerably higher among men (46.7%) compared to women (25.3%). High use of smokeless tobacco among both men and women was due to social acceptance and belief regarding role in minor ailments like tooth ache. NFHS – III report documented a lower rate of smokeless tobacco use among men (39.6%) and women (9.8%) as compared to our study.[60] The overall prevalence of smokeless tobacco, the mean age of onset and duration was comparable with a population based study done in rural Andhra Pradesh.[95] In our study the prevalence among men was two times that of women. On the contrary a study conducted in Pune district the proportion among men (25.7%) was five times that of women (4.8%).[15]

In the present study, prevalence of alcohol use was 21.4%. Among men the prevalence was very high (41.8%) as compared to that of women (2.0%). A study conducted at rural Tamil Nadu showed a higher prevalence among men (69.8%) and lower prevalence among women (1.3%).[13] Daily consumption of alcohol was noted in 19.5% of participants in our study which was much higher than recorded in a study conducted at rural area of Vietnam (9.9%) and Pune (9 In the present study, the prevalence of self reported hypertension was among 20.2% of the participants, with higher prevalence among women (22.9%) compared to men (17.4%). A study conducted at rural area of Indonesia reported a similar overall prevalence (21.6%).[77] Another study done at rural area of Mukim Dengkil, Malaysia reported a higher prevalence of self reported hypertension among men (31.7%).[12] In a similar study done at rural Faridabad district showed a higher prevalence of self reported hypertension among women (6.8%) compared to men (3.5%).[16]

In our study, 6.3% of them reported having diabetes mellitus; prevalence among men was 7.9% and 4.8% among women. A similar prevalence was noted in a study conducted at rural area of Tamil Nadu (4.0%).[13] Another study done in 18 states of India documented a prevalence of 3.3% and 4.4% in men and women respectively.[17]

In the present study the overall prevalence of overweight and obesity were 26.7% and 7.0% respectively. Study conducted in rural area of Pune reported 18.0% of overweight and 3.2% of obesity which was much less compared to our study.[15] The prevalence of obesity among women was high compared to men. Similar findings were documented in a study done in other rural areas of Tamil Nadu and Mukim Dengkil, Selangor.[12,14] Overall 33.7% of the paricipants had BMI >25.0 $Kg/m^2$ in our study which was well in accordance with the estimated range of overall prevalence for South East Asia i.e., 26.3% – 56.0%.[18]

The overall prevalence of central obesity assessed by WC and WHR were 37.9% and 69.2% respectively. Women had higher values of WC and WHR. Other similar studies documented a lesser over all prevalence but the proportion was higher among women.[11,15,17] The remarkably high WHR and WC observed in our study in both males (41.0% and 23.0% respectively) and females (96.0% and 52.0% respectively) which requires special attention. Similar finding with two fold increased prevalence among women was observed in a study done in rural area of Thiruvanantapuram district of Kerala.[19]

Increased predisposition to premature CAD in Indians has been attributed to the "Asian Indian phenotype", characterized by less of generalized obesity measured by BMI and greater central body obesity as shown by greater WC and WHR.[20] Our study substantiates this hypothesis.

In the present study the prevalence of systolic and diastolic hypertension was 26.6% and 29.0% respectively. Hypertension prevalence was slightly high in males as compared to females. A study done in rural area of Pune district also substantiated our findings of higher proportion of systolic and diastolic hypertension among men (19.7% and 17.0% respectively) compared to women (15.6% and

14.4% respectively).[81] Two other studies reported overall higher prevalence of hypertension of 35.3% and 36.9% done at Eastern Nepal and Delhi respectively.[11,21]

In our study, the behavioral and biological risk factors measured were assessed and depending on the number of risk factors present among each individual they were further stratified into 3 groups as; no risk factors, 1 to 2 risk factors and ≥ 3 risk factors and the proportion of the participants were 22.8%, 51.3% and 25.9% respectively. Men were having more risk factors than compared to women. This could be attributed to higher prevalence of tobacco use and alcohol consumption among them. A study conducted in rural Indonesia reported the clustering of risk factors for risk assessment into 3 groups as; no risk factors, 1 risk factor and ≥ 2 risk factors in the proportion of 59.7%, 33.3% and 7.0% respectively.[22]

The CAD risk was predicted using WHO / ISH risk prediction charts among the participants aged 40 years and above. 50.6% of the participants had some risk of fatal or non-fatal cardio vascular event in their near future decade which is a significant high burden in the rural area. Women exhibited a significant higher risk in each level of risk prediction categories. This could be attributed to the attainment of menopause and associated higher prevalence of smokeless tobacco use, overweight and raised blood pressure, which pose an increasing risk for CAD and in the middle age women tend to develop more number of risk factor. In our study, the prevalence of the Impaired Fasting Glucose (IFG) was high in 1 to 2 risk factor group and blood sugar level of ≥ 126 mg/dL was seen in more than or equal to 3 risk factor prevalence was high in more than or equal to 3 risk factor group. This difference was statistically significant (P = 0.017). The mean ± standard deviation of serum FBS was found to be increasing with increased number of risk factors.

Our study noted a high prevalence of hyper cholesterolaemia among sample of participants with 3 or more CAD risk factors (P = 0.023). The mean ± standard deviation of serum TC was found to be increasing with increased number of risk factors.

In our study, the prevalence of hyper triglyceridemia done on selected participants was noted higher in individuals with one of more risk factors (86.1%) (P = 0.020). The mean ± standard deviation of serum TGL was found to be increasing with increasing number of risk factors.

Our study noted a higher proportion of a HDL value of < 40 mg/dL among sample of deviation of serum HDL was decreasing with increasing number of risk factors. individuals with one or more risk factors; although it did not show statistical difference (P = 0.113). The mean ± standard

**CONCLUSION:**

The present community based study, reported a higher prevalence of behavioral risk factors for CAD which included tobacco consumption in any form, alcohol use, low fruit and extra salt consumption, sedentary at work, leisure and travel and history of hypertension and DM was documented; with higher proportion among men. Biological risk factors which included hypertension and overweight were observed in a significantly higher proportion among men; whereas women were more obese with a significant higher proportion of them being centrally obese. Three fourth of the participants had one or more risk factors for CAD; whereas about one third of them had 3 or more risk factors. Bio-chemical risk factors including FBS, TC and TGL levels showed a significant increase in their mean values with increase in number of risk factors, whereas HDL level was more in those with lesser number of risk factors. Half of the participants, especially women had some risk of major cardio vascular event in their near future decade. Higher proportion of CAD risk factors were noted among individuals with family history of CAD.

The prevalence of behavioral and biological risk factors increased with advancing age; lesser or no education was a significant factor for higher prevalence of tobacco use; hypertension, DM and abdominal obesity. Conversely, higher education was proportional to increased sedentary life style.

Sedentary work status was the determinant factor in high prevalence of tobacco use in any form, alcohol use, physical inactivity, hypertension, DM and overweight. Higher SES was noted to be more sedentary. But majority of the behavioral and biological risk factors did not differ in their prevalence across the SES class. Our study demonstrated a significant higher prevalence of behavioral and biological risk factors for CAD in rural population in South India. Burden of CAD risk factors in this population reflects epidemiological transition which requires an immediate attention.

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