

Assessment of Cardiovascular Risk Factors Among Adults Attending General Outpatient Departments of Rural Field Practice Areas of a Medical College in Lucknow

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Abstract

Background: Cardiovascular diseases (CVDs) are the top cause of deaths worldwide, and the prevalence of modifiable risk factors (MRFs) like hypertension, obesity, tobacco use, unhealthy diet and physical inactivity are on the rise in India. It is important to identify such risk factors at an early stage to allow effective prevention, especially in rural populations.

Objectives: To find out the prevalence and co-occurrence of cardiovascular risk factors among adult population attending the general outpatient department of a rural field practice area of a medical college at Lucknow and to see their association with the sociodemographic characteristics.

Methods: The method is descriptive cross sectional study, the number of samples are 150 people, systematic random sampling. The data collected included behavioural risk factors and physical measurements, and were obtained via the WHO STEPwise Approach to Surveillance (WHO STEPS) Instrument. Descriptive statistics, Chi-square test and multivariable logistic regression were used for statistical analysis.

Results: Factors most commonly reported were central obesity (42.7%), physical inactivity (40.7%), obesity (34.7%), tobacco use (30.7%) and hypertension (28.7%). Overall, 60.0% of the participants had 2 or more Cardiovascular Risk Factors. The age, sex, physical inactivity and central obesity were significantly associated with risk factor clustering.

Conclusion: It brings up the significant burden of modifiable cardiovascular risk factors among rural adults. In order to decrease the burden of cardiovascular diseases in the future, routine screening (WHO STEPS approach) and community-based lifestyle interventions are needed.

Keywords: Cardiovascular diseases, Risk factors, WHO STEPS, Rural population, Hypertension, Obesity, Risk factor clustering.

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1. Introduction

The CVDs are the top cause of mortalities across the globe and are a significant public health issue [1].

CVDs cause death in nearly 17.9 million people each year, or around 32% of all deaths worldwide, according to the World Health Organization (WHO)

[2]. Over three-quarters of these mortality rates are reported in low- and middle-income countries where the disease burden is growing as a result of high levels of rapid urbanization, lifestyle changes and poor access to prevention health care [3]. Increased occurrence of modifiable risk factors has now made the early detection and prevention of CVDs a priority issue for global health.

India is transitioning from a communicable disease to a non-communicable diseases (NCDs) dominant disease burden [4]. Cardiovascular diseases make up a large percentage of the deaths that occur in the country at an early age [5]. While once thought to be mainly urban health issues, however, recent evidence suggests that unhealthy lifestyles—such as eating unhealthy diets, smoking and drinking alcohol, not being physically active, obesity, and living longer—may be contributing to the growing prevalence of CVDs in rural areas [6,7]. In rural areas, there is poor knowledge and access to regular health screening, which adds to the risk of delayed diagnosis and complications [8].

Cardiovascular diseases do not have to be genetic, there are several risk factors that can be modified. Hypertension is one of the most important risk factors for cardiovascular events, and obesity and central (abdominal) obesity are also risk factors for hypertension, diabetes mellitus and metabolic disorders [9]. Smoking, smokeless tobacco and excessive drinking of alcohol are strong risk factors for cardiovascular disease [10]. Also, sedentary lifestyle and eating diets high in salt, saturated fat and processed foods lead to the worsening of cardiovascular disease. These factors are commonly found in a person together, so they can't be assessed without each other to determine high-risk populations [11, 12].

Because there are many people who present to health services without having had a prior cardiovascular evaluation, there is an important opportunity for opportunistic screening in adult patients attending rural general outpatient departments [13]. WHO STEPwise Approach to Surveillance (STEPS) provides a standardised approach to measuring behavioural risk factors using questionnaires (Step 1) and physical measurements including blood pressure, height, weight, BMI and waist circumference (Step 2). This enables a consistent and comparable measurement of cardiovascular risk factors.

Hence the present study was conducted to estimate the prevalence and clustering of cardiovascular risk factors in the adults who visited the general outpatient departments of a medical college in field practice areas of the townships of the rural areas of Lucknow. The study further aims to explore the relationship between sociodemographic risk factors

and cardiovascular health risk factors for the generation of evidence for targeted preventive strategies and bolstering primary healthcare interventions.

2. Materials and Methods

Study Design

Descriptive Cross Sectional study was done to evaluate the prevalence and clustering of cardiovascular risk factors amongst the adults attending OPD. The study design allowed for the evaluation of the behavior and physical risk factors at one time.

Study Setting

The study was conducted in the General Outpatient Department of the General Outpatient Department of the medical college attached with the Rural Health Training Centre at Lucknow. The centre is the primary health services' centre for the surrounding rural population and also is a field practice area for community based research.

Study Duration

The study lasted for three months (20th July 2025 to 20th September 2025).

Study Population

The study population included all adults (18 years and above) who attended the general OPD during the study period.

Inclusion Criteria

The adults (18 years or above) attending OPD, who were willing to participate and gave written informed consent were included in the study.

Exclusion Criteria

Patients with cognitive or communication difficulties that could not ensure the data was collected were not included and pregnant females were excluded due to emergency medical needs.

Sample Size Calculation

The sample size was determined based on the formula $n = 4PQ/L^2$ where $P = 9\%$ (estimated prevalence of CVDs), $Q = 91\%$ and $L = 5\%$ (absolute precision). A sample size of 131 was found. The final sample size was 150, after accounting for the potential for non-response by adding 10%.

Sampling Technique

The daily OPD registration list was used as a sampling frame and systematic random sampling was used. The first individual was randomly selected and each third registered patient who fulfilled the inclusion criteria was recruited until the sample size was reached.

Study Tool

WHO STEP wise Approach to Surveillance (WHO STEPS) was used to collect data. Structured questionnaires for collecting sociodemographic data and behavioral risk factors (tobacco use, alcohol intake, diet, physical activity) were used in Step 1.

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Standardized physical measurements such as height, weight, body mass index (BMI), waist circumference and blood pressure (BP) by calibrated equipment constituted Step 2.

Operational Definitions

Variable	Definition
Hypertension	Blood pressure $\geq 140/90$ mmHg or on antihypertensive medication
Obesity	BMI ≥ 22.9 kg/m ²
Central obesity	Waist circumference >90 cm (men) and >80 cm (women)
Tobacco use	Current smoking or smokeless tobacco use
Physical inactivity	<150 minutes of moderate physical activity per week

Data Collection Procedure

All participants gave written informed consent prior to participation. Face-to-face interviews were conducted with trained investigators and standardized physical measurements were taken, with the WHO STEPS questionnaire. The equipment was calibrated regularly and standard operating procedures were used to ensure accuracy, uniformity and quality in the data collection process.

Data Management

Data was collected using EpiCollect (electronic data entry), checked for completeness and transferred to MS Excel 2017 and SPSS version 22.0 for cleaning and analysis.

Statistical Analysis

Data were summarized using descriptive statistics as frequencies, percentages, means and standard deviations. The Chi-square test was used for categorical variables to determine the association between them, and Independent t-test or Mann Whitney U test was used for continuous variables, as appropriate. Multivariate logistic regression analysis was used to determine predictors of clustering of cardiovascular risk factors. P values <0.05 were considered statistically significant.

Ethical Considerations

After obtaining Approval from Institutional Ethics Committee of Integral Institute of Medical Sciences and Research (IIMSR) the study was carried out. All participants had written informed consent and personal information was kept confidential. The participation was voluntary, and any participant who desired to be withdrawn was permitted to be. Those who had abnormal findings were referred to the appropriate clinical department for further evaluation and management.

3. Results

150 adults in general outpatient department were studied. The findings include sociodemographic characteristics, behavioral and anthropometric risk factors, blood pressure status, prevalence and clustering of cardiovascular risk factors and factors associated with risk factor clustering.

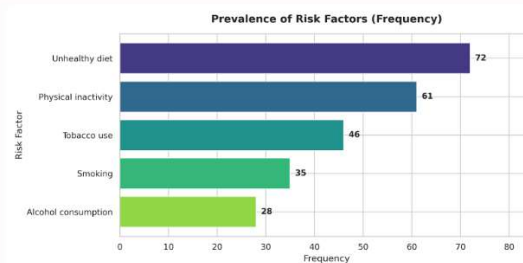
Table 1. Sociodemographic Characteristics of Participants (N = 150)

Variable	Category	Frequency	Percentage (%)
Age (years)	18–29	36	24.0
	30–44	49	32.7
	45–59	41	27.3
	≥ 60	24	16.0
Gender	Male	82	54.7
	Female	68	45.3
Education	Up to Primary	32	21.3
	Secondary	58	38.7
	Graduate & Above	60	40.0
Occupation	Employed	84	56.0
	Unemployed/Homemaker	66	44.0
Marital Status	Married	104	69.3
	Others	46	30.7

Most participants were 30–44 years old, male, married and at least secondary educated.

Table 2. Behavioral Cardiovascular Risk Factors

Risk Factor	Frequency	Percentage (%)
Tobacco use	46	30.7
Smoking	35	23.3
Alcohol consumption	28	18.7
Physical inactivity	61	40.7
Unhealthy diet	72	48.0



The unhealthy dietary factors and physical inactivity were the most common behavioral risk factors noted.

Table 3. Anthropometric Characteristics

Variable	Mean $\pm$ SD
Height (cm)	163.8 $\pm$ 8.7
Weight (kg)	66.9 $\pm$ 11.4

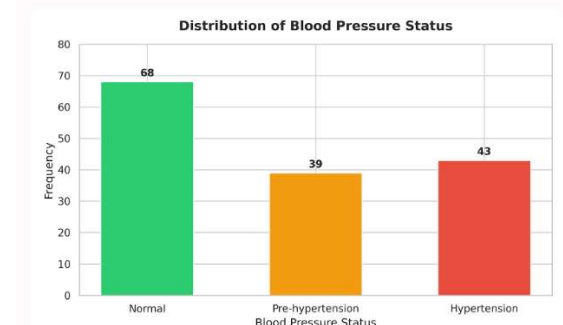
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BMI (kg/m ²)	24.8 ± 3.9
Waist Circumference (cm)	88.2 ± 10.3

The participants' mean BMI was in the overweight range, and their mean WC was just below the threshold for central obesity.

Table 4. Blood Pressure Distribution

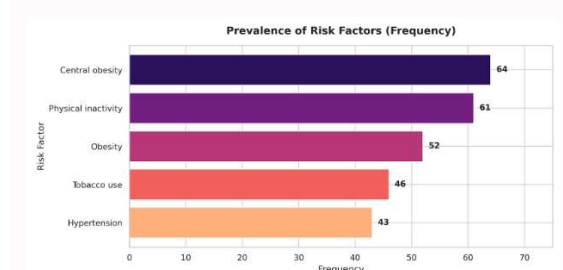
Blood Pressure Status	Frequency	Percentage (%)
Normal	68	45.3
Pre-hypertension	39	26.0
Hypertension	43	28.7



Almost a third of participants had hypertension and one fourth had pre-hypertension.

Table 5. Prevalence of Cardiovascular Risk Factors

Risk Factor	Frequency	Percentage (%)
Hypertension	43	28.7
Obesity	52	34.7
Central obesity	64	42.7
Tobacco use	46	30.7
Physical inactivity	61	40.7



Central obesity, physical inactivity and obesity were the most common cardiovascular risk factors.

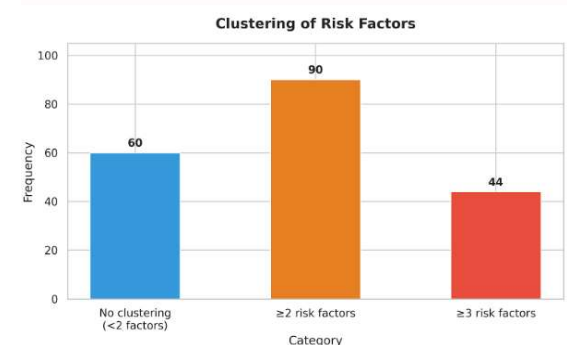
Table 6. Number of Risk Factors per Participant

Number of Risk Factors	Frequency	Percentage (%)
0	18	12.0
1	42	28.0
2	46	30.7
3	29	19.3
≥4	15	10.0

There were multiple cardiovascular risk factors for the majority of participants, with 30.7% having two of the risk factors concurrently.

Table 7. Clustering of Cardiovascular Risk Factors

Category	Frequency	Percentage (%)
No clustering (<2 factors)	60	40.0
≥2 risk factors	90	60.0
≥3 risk factors	44	29.3



In general, 60.0% of the participants had two or more cardiovascular risk factors.

Table 8. Association Between Sociodemographic Characteristics and Risk Factor Clustering

Variable	Chi-square	p-value
Age group	11.62	0.009*
Gender	4.38	0.036*
Education	6.27	0.044*
Occupation	5.11	0.024*

There was a significant association of risk factor clustering with increased age, male sex, education level and occupation (p<0.05).

Table 9. Logistic Regression Analysis Predicting Risk Factor Clustering

Variable	Odds Ratio	95% CI	p-value
Age ≥45 years	2.48	1.28–4.82	0.007*
Male gender	1.89	1.03–3.47	0.039*
Physical inactivity	2.74	1.42–5.27	0.002*
Central obesity	3.18	1.61–6.29	0.001*

Central obesity, physical inactivity, age ≥45 years and male gender were identified as independent risk factors for clustering of cardiovascular risk factors in multivariable logistic regression. The strongest association was with central obesity, where those with >3 cardiovascular risk factors were over three times more likely.

4. Discussion

4.1 Major Findings

The present study aimed to evaluate the cardiovascular risk factors among adult population

attending the rural general outpatient department of a medical college, Lucknow. The prevalence of modifiable heart disease risk factors was high, and the most prevalent were central obesity, physical inactivity, obesity and hypertension. A significant proportion (over half) of all participants had two or more risk factors, suggesting high prevalence of cardiovascular disease (CVD) risk amongst the study population.

4.2 Prevalence of Individual Risk Factors

The high prevalence of hypertension, obesity, tobacco use, and physical inactivity found in this study is in line with the results of the WHO STEPS surveys, ICMR-INDIAB study, and the National Family Health Survey (NFHS-5) that indicate that cardiovascular risk factors are increasing among Indian adults [14]. The epidemiological transition and lifestyle changes are also seen through other similar community-based studies which have been carried out in various parts of India and have reported the increasing urbanization of obesity and hypertension in rural areas.

4.3 Sociodemographic Associations

A higher prevalence of cardiovascular risk factors was significantly associated with increasing age, as is expected with the progression of metabolic disorders. Male participants showed higher levels of clustering of risk factors, mostly because of higher tobacco and alcohol consumption. The high cardiovascular risk was also linked to lower educational levels and unemployment, which could be due to decreased knowledge of health and access to preventive health care. The indirect effects of income on diet, physical activity, and health services utilization could have an impact on CV risk.

4.4 Risk Factor Clustering

Many participants had multiple concurrent risk factors (clustering), and people with risk factor clustering tended to have more factors than those without clustering. Their clustering is due to the fact that behavioral factors that promote obesity (such as unhealthy diet and lack of exercise) are often present together, causing obesity, hypertension, and other metabolic abnormalities. This substantially raises the risk for future CV events and is a strong argument for combined prevention measures over the prevention of a single risk factor.

4.5 Comparison with Previous Studies

The present findings corroborate the findings of the WHO STEPS survey, as well as those of several Indian studies that have reported an increasing prevalence of cardiovascular risk factors and clustering of these among adults [15]. Cardiovascular diseases are not only found in urban populations, as similar observations have also been made among rural people.

4.6 Public Health Implications

The results highlight the importance of the need for periodic cardiovascular risk assessment at primary health care settings. Healthy lifestyle habits (such as diet, physical activity, quitting smoking and drinking alcohol, monitoring blood pressure regularly) should be encouraged. Community-based awareness programmes and early intervention strategy are crucial in order to diminish the burden of cardiovascular diseases in the rural population in the future.

4.7 Strengths of the Study

Standardized WHO STEPS instrument was used which ensured uniform assessment of the behavioral and physical risk factors. The participants were examined in a comprehensive way for multiple cardiovascular risk factors, thus giving a holistic assessment of the cardiovascular health of the participants, and systematic random sampling minimized selection bias.

4.8 Limitations

A cross sectional design does not allow for causal relationships to be formed. The results obtained in this study may not be applicable to all populations since the study was carried out in one rural field practice area. Behavioral variables were self-reported, and thus were prone to recall bias. Furthermore, biochemical measurements not used in the WHO STEPS Step 3 were not evaluated and this might have underestimated the cardiovascular risk profile.

5. Conclusion

The findings indicate that even at the rural outpatient departments, there were a high proportion of adults with modifiable cardiovascular risk factors, with central obesity, physical inactivity, obesity and hypertension being the most common. There was a high prevalence of clustering of risk factors especially in older adults and males. The WHO STEPS approach, which is a routine opportunistic screening, combined with lifestyle modification and community based preventive programmes can help to detect, at an early stage, the potential burden of cardiovascular diseases in the future in rural populations.

6. Recommendations

- Conduct regular cardiovascular risk assessments of all adults in rural outpatient departments.
- Improve health education initiatives that encourage healthy eating, physical activity and weight control.
- Increase tobacco and alcohol support services at primary health care centres.

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- Conduct community based screening and awareness camps against hypertension and obesity periodically.
- Include WHO STEPS approach in regular primary health care for a uniform cardiovascular risk assessment.
- Develop specific intervention strategies for higher risk groups based on the clustering of risk factors, to prevent cardiovascular mortality and morbidity in the future.

Declarations

Funding: No external funding was received for this study.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: IEC/IIMSR/2025/182

Consent for Publication: Not applicable.

Author Contributions: All authors contributed equally to conceptualization, manuscript drafting, and final approval.

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