



Original Article

Prevalence of cardiovascular risk factors in rural population of Puducherry

Malathy R.¹, Gomathy R.²

¹Professor cum Head, Department of Medical Surgical Nursing, ²Former professor cum Head, Department of Nursing Foundation, Vinayaka Mission's College of Nursing, Aarupadai Veedu Medical College & Hospital campus, Kirumampakkam, Puducherry, Affiliated to VMRF(DU), Salem, India.

***Corresponding author:**

Dr. Malathy R.,
Professor cum Head,
Department of Medical
Surgical Nursing, Vinayaka
Mission's College of Nursing,
Aarupadai Veedu Medical
College & Hospital campus,
Kirumampakkam, Puducherry,
Affiliated to VMRF(DU),
Salem, India.

rmalathy2009@gmail.com

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ABSTRACT

Objectives: Rapid changes in India's population and epidemiology are being brought about by Noncommunicable diseases, which significantly increase morbidity, mortality, and disability in both urban and rural populations, as well as in all socioeconomic groups. The aim of this study was to assess the prevalence of Cardiovascular Risk Factors (CVRF) in the rural population of Puducherry.

Material and Methods: This cross-sectional descriptive study was conducted in Puducherry's rural field practice area, which is connected to Aarupadai Veedu Medical College & Hospital (AVMC&H). A total of one thousand rural residents, ages 40 to 75, comprised the samples. With the aid of a modified WHO steps approach, a structured questionnaire containing physical measurements, CVRF information, and sociodemographic details was used to collect the data. SPSS version 28.0 was used to analyse the data. The prevalence of CVRF was determined using percentages, and the degree of correlation between the rural population's CVRF and their demographic characteristics were examined.

Results: The following behaviours have the highest prevalence of CVRF: smoking (28.3%), drinking alcohol (13.8%), not exercising (48%), consuming coffee (60.2%), tea (61.4%), artificial beverages (42.6%), nonvegetarian (98.1%), consuming insufficient amounts of fruits and vegetables (32%), insomnia (59.4%), being overweight (18.5%), class I obesity (6.4%), hypertension (25%) and diabetes mellitus (25.1%). The cardiovascular risk factors of the rural population, such as the use of tobacco products ($p < 0.001$), the consumption of coffee, tea, and artificial beverages ($p < 0.001$), the use of alcohol ($p < 0.001$), the non-vegetarian diet ($p < 0.001$), the insufficient intake of fruits and vegetables ($p < 0.001$), obesity ($p = 0.001$), Waist Hip Ratio (WHR) at risk ($p < 0.001$), hypertension ($p < 0.001$), and diabetes ($p < 0.001$), were strongly statistically significantly associated with demographic variables.

Conclusion: A significant proportion of Puducherry's rural population has cardiovascular risk factors. It is imperative to reduce the prevalence of cardiovascular risk factors in the community by implementing lifestyle modifications that suppress risky behaviours at an early age.

Keywords: Prevalence, Cardiovascular risk factors, Rural population, Puducherry

INTRODUCTION

In the past few decades, India has seen a rapid shift in its epidemiology. Non-communicable diseases (NCDs) are on the rise in India and are posing a bigger threat to public health than life expectancy alone. Over 80% of premature NCD deaths are caused by the four major NCDs: diabetes, cancer, chronic respiratory diseases (CRD) and cardiovascular diseases (CVD). Among older persons 45 years of age and older, the overall self-reported prevalence of diagnosed CVDs was 29.4%. An elevated risk of CVD was linked to age. Compared to men, women were more

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likely to have CVDs. The three main risk factors for CVDs were elevated cholesterol, diabetes mellitus and physical inactivity.^[1]

The study found a strong correlation between occupational exposure to agrochemicals ($p < 0.0001$) and diabetes prevalence among rural farming people. The prevalence of diabetes was found to be 11.9% in this population. In addition, the prevalence of diabetes was nearly twice as high in the farming community (15.0%) as it was in the non-farming population (8.7%).^[2]

Indians have a higher incidence of cardiovascular disease risk factors at a younger age than people in high- and upper-middle-income nations.^[3]

In the Solan district of Himachal Pradesh, North India, rural residents with a higher socioeconomic status had higher rates of diabetes and hypertension. For those living in rural areas with graduate-level education and family incomes greater than 15,000 Indian rupees, tobacco usage was low, and obesity was high.^[4] For men, the risk variables for CVD were smoking and hypertension; for women, the risk factors were central obesity, self-reported diabetes and hypertension.

^[5] The Indian women living in rural areas reported eating fewer fruits and vegetables but expressed a desire to eat more.

^[6] About one-third (35%) of the population, with a mean age of 48 years, had diabetes and hypertension or was a current smoker.^[7] The following were found to be prevalent: less than five servings of fruits and vegetables, more than five grams of salt intake, alcohol usage, smokeless tobacco product use, smoking tobacco, overweight/obesity, and their respective percentages were 27.08%, 24.1%, 91.61%, 10.9% and 34.86%. Subjects who were over 35 years old, male, illiterate and members of scheduled castes or tribes were substantially ($p < 0.05$) more likely to smoke tobacco, use smokeless tobacco and drink alcohol.^[8]

The key risk factors for NCDs increased between 1990 and 2016, with larger levels seen in states with higher epidemiological transition levels. These risk factors included high systolic blood pressure, high fasting plasma glucose, high total cholesterol, and high body-mass index.^[9] The study cohort in rural Kerala has experienced an increase in multiple NCD risk factors over a period of seven years.^[10] In rural Bidar, India, about 29.93% of people were currently using tobacco, either by chewing or smoking it, 27.29% were drinking alcohol, 13.3% had hypertension and 3.42% had diabetes.^[11]

In the rural field practice area attached to a medical college in Kancheepuram district, Tamil Nadu, India, the prevalence of risk factors for NCDs is as follows: tobacco use (17.8%), alcohol use (17.3%), physical inactivity (50.2%), unhealthy diet (62%), overweight (38.1%), obesity (11.4%), hypertension

(15.7%), and diabetes (21.9%), respectively. The relationship between alcohol, diabetes, hypertension, and obesity was statistically significant.^[12] Tobacco use was significantly higher among men (32%), adults between the ages of 18 and 34 (35%), the self-employed (72%), and the primary school educated (80%). Men experienced the frequency eleven times higher than women in rural Gujarat.^[13]

In a rural block in the Vellore district of Tamil Nadu, India, 21% of the population used tobacco, 62% drank alcohol, 63% engaged in little physical activity, 63% consumed little fruit and vegetable consumption, 31% were overweight, 17% had hypertension, and 1% had diabetes. Over time, and as rural residents' lifestyles changed, it's possible that more people living in rural areas developed CVD risk factors.^[14]

The percentages of smokers and users of smokeless tobacco in rural Wardha were 14.2% and 54.9%, respectively. Each participant consumed 14.6 grams of salt each day. Roughly 19% of men had sedentary lifestyles. Overweight and obese people made up 8.8% and 9.5% of the population, respectively.^[15] In Chandigarh, Jharkhand, Maharashtra, and Tamil Nadu, respectively, 88.4%, 94.8%, 91.3%, and 93.1% of the individuals reported not engaging in any recreational activities. As people aged, the proportion of those who did not engage in any recreational activities rose.^[16]

In rural Pondicherry, India, the incidence of type 2 diabetes mellitus in adults was 2% year; the rate increased twice as quickly in men as in women.^[17]

The increased consumption of fruits and vegetables may protect against cardiovascular disease and is in line with the recommendations made by the current dietary guidelines.^[18,19]

Furthermore, not much is known about how common risk factors are among people living in rural areas. The southernmost tip of the Indian Peninsula is home to Puducherry, a Union Territory. According to the 2011 Census, Puducherry had a total population of 1,247,953.^[20]

The Cigarettes and Other Tobacco Products Act 2003 (COTPA 2003) was the comprehensive tobacco control law passed by the Indian government in 2004.^[21]

Therefore, we designed this study to assess the prevalence of cardiovascular risk factors in the rural population of Puducherry.

MATERIAL AND METHODS

This cross-sectional descriptive study was conducted in rural field practice areas of Aarupadai Veedu Medical College & Hospital (AVMC&H), Puducherry. A total of one thousand samples were chosen using a multi-stage random sampling technique. The study's inclusion criteria included being a

resident of the study area who was 40 years of age or older, could speak Tamil or English, was willing to participate in the study, and could be present in the area when data was being collected. The samples with mental illness, pregnancy, impaired hearing, severely ill, and residents outside of rural field practice areas were excluded. There were 2051 houses. The first house was chosen using a lottery system using a simple random technique at the first stage. Every second house in the area was then chosen using a systematic random sampling technique until the desired sample size was reached. The survey was conducted from house to house in the second phase. If there were multiple adults in the house who were 40 years of age or older, one eligible adult would be chosen at random using the lottery method. In the event that no adult who qualified was present, the next house was chosen.

Using a modified version of the World Health Organization STEPwise approach to the NCD risk factor surveillance instrument, a standardised pretested structured interview schedule was used to gather the data.

Step 1: Data on demographics, health profile, and behavioural risk factors (such as smoking, consumption of alcohol, consuming coffee, tea, and artificial beverages, eating habits, fruits, and vegetable intake, types of work, exercise, and sleeping time) was gathered. Step 1 involved taking physical measurements such as height, weight, body mass index (BMI), hip and waist circumferences, waist hip ratio (WHR), and blood pressure (BP). The measurements of height, weight, waist circumference (WC) and hip circumference (HC) were taken in accordance with WHO standards. Standing and wearing only light clothing, the samples' height and weight were recorded using a wall-mounted stadiometer (EASY CARE, IND/06/10/011425) and a digital battery-powered scale (OMROM, HN 289), respectively. The accuracy of the weight and height measurements was within 100 grams and 0.1 cm, respectively. The Quetelet formula was used to calculate the BMI. A flexible measuring tape was used to record WC and HC to the closest 0.1 cm. While seated, a BP reading was taken. With an upper arm electronic BP monitor (OMRON, HEM 7121 J), two readings were taken within ten minutes intervals while the sample was seated. The blood pressure level was calculated by averaging the two readings. Every piece of equipment that was used to collect the data had been calibrated on a regular basis.

Step 2: If two or more of the following five risk factors apply to any of the eligible and consenting samples from Step 1, they are eligible for Step 2. Diabetes mellitus, known or recently discovered hypertension, high waist circumference, tobacco use in any form, and a high BMI. The eligible samples (n = 282) were given written instructions on the requirements for collecting a fasting blood sample the day before the sample was to be collected. After an overnight fast of 10–12 hours,

blood samples were taken. Using a lancet device, a seated blood sample was obtained, and a blood glucose monitoring system One Touch Ultra Plux Flex Glucometer (ONE TOUCH) was used for estimation.

The Institutional Ethics Committee (Human Studies) clearance has been obtained (AV/IEC/2020/026). The sample size was calculated from the study of Kahar *et al.*^[13] (2016). All of the gathered data were imported into Microsoft Excel, and Statistical Package for Social Sciences (SPSS) version 28.0 was used for analysis. We used percentages to calculate the prevalence of Cardiovascular Risk Factors (CVRF) and rural population demographic variables were tested for statistical significance (p value and chi square test) and strength of association. A p-value of less than 0.05 was deemed statistically significant in the models.

RESULTS

Demographic Variables of the Study Population

The age group of 40–50 years old constituted the majority of the study population (44.1%). Of them, approximately 75.7% were women and 89.9% were married. 75.2% were Hindus. According to educational status, 25% had finished high school and 33.23% had no formal education. 17.7% of workers received daily wages, and 17% were farmers. 74% of people were in a nuclear family. A family's monthly income ranged from Rs. 4810–8009 for about 33.6% of the population, and the majority of them (56.3%) had received health information from friends and family.

Health Profile of the Study Population

Comorbidity was present in about 19.3% of the rural population. In 62.6% of them, hypertension was self-reported. The majority of them had comorbidity for one to two years, which had started between the ages of 46 and 50. Of them, 95.4% had never been admitted to the hospital before, 13.9% were receiving regular care, and 0.7% were using herbal remedies for their comorbidities.

Prevalence of Cardiovascular Risk Factors of Study Population

Of the people living in rural areas, approximately 17.1% used smokeless tobacco, and 112 (11.2%) were smokers. 89% of rural residents had diabetes mellitus, 8.2% had pre-diabetes, and about 2.8% had normal fasting blood sugar (FBS) [Table 1].

Consumption of Artificial Beverages, Tea, Coffee and Alcohol

The daily intake of coffee, tea and artificial beverages was observed in 60.2%, 61.4% and 42.6% of the rural population,

Table 1: Prevalence of tobacco habits and diabetes mellitus of study population.

Prevalence of tobacco consumption		Frequency (n = 1000)	%
Smoking tobacco	Yes	112	11.2
	No	888	88.8
Smokeless tobacco	Yes	171	17.1
	No	829	82.9
Classification of FBS (n = 282)			
Normal (< 100 mg/dl)		8	2.8
Pre diabetes mellitus (100–125 mg/dl)		23	8.2
Diabetes mellitus (126 mg/dl or above)		251	89

FBS: Fasting Blood Sugar

respectively. 50.5%, 48.9%, and 78.1% of them, respectively, reported consuming coffee, tea, and artificial beverages in excess of 100 millilitres per day. Of the study population, 138 individuals (13.8%) reported consuming alcohol.

Food Habits

About 98.1% of people were non-vegetarian. It was found that 680 (68%) and 599 (59.9%) of them consumed one to three servings of fruits and vegetables per week, respectively.

Types of Works, Exercise and Sleep

In the study population, 43.4% reported doing light, 48% of them did not exercise and a quarter of them slept for less than five hours every day.

Body Mass Index

According to the study population’s BMI distribution, 18.5% of rural residents were found to be overweight, 6.4% to be class I obese, and 3.3% to be underweight [Figure 1].

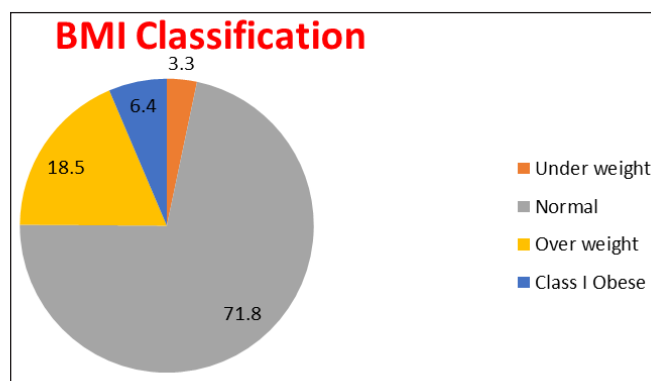


Figure 1: Distribution of Body Mass Index among the study population.

WHR and Hypertension

Of them, nearly half (46.67%) had WHR that was at risk. About 4.7% of them had stage I systolic hypertension, 5.9% had stage I diastolic hypertension and 14.4% had pre systolic hypertension.

Association between CVRF and their Demographic variables

Non-vegetarian food consumption, excessive coffee consumption, inadequate sleep and hypertension were all significantly associated with the rural population between the ages of 40 and 50, regardless of gender. Females between the ages of 51 and 60 were associated to elevated systolic and diastolic hypertension, diabetes mellitus, obesity, excessive tea consumption, smokeless tobacco use, and WHR at risk. Samples with a family income ranging from Rs. 4810–8009 per month showed a strong association with tobacco use, excessive coffee and tea consumption, alcohol abuse, non-vegetarian food consumption, and low intake of fruits and vegetables. There was a noteworthy association found between the illiterate rural population and obesity, alcoholism, low intake of fruits and vegetables, inadequate sleep, diabetes mellitus, hypertension, and sources of health information. And also a significant association was found between nuclear families and diabetes mellitus, hypertension and obesity.

DISCUSSION

According to our study, there are CVD risk factors for people in rural Puducherry who are between the ages of 50 and 60. In the study population, smoking and smokeless tobacco use were found to be prevalent at 11.2% and 17.1%, respectively. Studies by Velmurugan *et al.*, Agarwal *et al.*, Kaur *et al.*, Khetan *et al.*, Sathish *et al.*, Tondare *et al.*, Vijayakarhikeyan *et al.*, and Joshi *et al.* were comparable to this one.^[2,4,5,7,10-12,18] Alcohol consumption was prevalent in 138 (13.8%) of the study participants, which is consistent with the findings of studies conducted by Velmurugan *et al.*, Agarwal *et al.*, Sathish *et al.*, Tondare *et al.*, Vijayakarhikeyan *et al.*, and Joshi *et al.*^[2,4,10-12,18] According to the study’s findings, 98.1% of people are non-vegetarians, which is in line with research done by Agarwal *et al.*, Sathish *et al.*, Tondare *et al.*, and Vijayakarhikeyan *et al.*^[4,10-12] Low prevalence of daily fruits and vegetable consumption—68% and 59.9%, respectively—was consistent with research by Kehoe *et al.*, Agarwal *et al.*, and Oommen *et al.*^[6,8,14] This demonstrates that the study population engaged in unhealthy lifestyle practises.

About 48% prevalence of physical inactivity is similar to that of studies conducted by Sathish *et al.*, Vijayakarhikeyan *et al.*, and Oommen *et al.*^[10,12,14] The study findings on the prevalence of overweight, obesity, WHR at risk, hypertension

and diabetes mellitus were 18.5%, 6.4%, 46.67%, 10.6% and 25.1%, in that order. Studies by Velmurugan *et al.*, Vasan *et al.*, Agarwal *et al.*, Kaur *et al.*, Sathish *et al.*, Tondare *et al.*, Vijayakarthykeyan *et al.*, Oommen *et al.*, Kumar *et al.*, Ghorpade *et al.*, and Joshi *et al.* were comparable to this one. [2,3,5,8,10-12,14,15,17,18]

The study revealed the following strong statistically significant association: smoking and individuals between the ages of 50 and 60 ($p < 0.001$); females who consume smokeless tobacco ($p < 0.001$); females who consume coffee ($p < 0.001$); females who consume tea and those between the ages of 51 and 60 ($p < 0.001$); males who consume alcohol ($p < 0.001$); non-vegetarians and those between the ages of 40 and 50 ($p < 0.001$); married individuals who consume low amounts of fruits and vegetables ($p = 0.048$); females who are obese and those between the ages of 40 and 50 ($p < 0.001$); hypertension and individuals between the ages of 40 and 50 ($p < 0.001$).

CONCLUSION

The study findings indicate that a high percentage of the study population has cardiovascular risk factors. Reducing the burden of increasing cardiovascular risk factors in rural populations requires early lifestyle modifications to control the rates of risky behaviours. This commands the reduction in this problem by raising awareness of the risk factors for cardiovascular disease. By raising awareness through the media, public health campaigns and other outreach initiatives, knowledge can be enhanced.

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Ethical approval

The research/study approved by the Institutional Review Board at The Institutional Ethics Committee (Human Studies) of Aarupadai Veedu Medical College, Puducherry, number AV/IEC/2020/026, dated 20/03/2020.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Kundu J, Kundu S. Cardiovascular disease (CVD) and its associated risk factors among older adults in India: Evidence from LASI Wave 1. *Clinical Epidemiology and Global Health* 2022;13:1–5.
2. Velmurugan G, Mohanraj S, Christy Yacob J, Keppanan S, Rekha B, Krishnasamy A, *et al.* Association of agriculture occupational exposure with diabetes and cardiovascular risk factors in South Indian villages: REDSI study. *Front. Cardiovasc. Med* 2021;8:737505.
3. Vasan SK, Antonisamy B, Gowri M, *et al.* Prevalence, incidence and predictors of cardiovascular risk factors: Longitudinal data from rural and urban South India and comparison with global data. *BMJ Open Diab Res Care* 2020;8:e001782.
4. Agarwal A, Jindal D, Ajay VS, Kondal D, Mandal S, Ghosh S, *et al.* Association between socioeconomic position and cardiovascular disease risk factors in rural north India: The Solan Surveillance Study. *PLoS ONE* 2019;14:e0217834.
5. Kaur P, Ramachandra Rao S, Venkatachalam R, Kangusamy B, Radhakrishnan E, Kaliaperumal K, *et al.* Risk factors for cardiovascular disease in rural South India: Cohort study. *BMJ Open* 2019;9:e029759.
6. Kehoe SH, Dhurde V, Bhaise S, Kale R, Kumaran K, Gelli A, *et al.* Barriers and facilitators to fruit and vegetable consumption among rural Indian women of reproductive age. *Food Nutr Bull* 2019;40:87–98.
7. Khetan A, Zullo M, Rani A, Gupta R, Purushothaman R, Bajaj NS, *et al.* Effect of a community health worker-based approach to integrated cardiovascular risk factor control in India: A Cluster Randomized Controlled Trial. *Glob Heart* 2019;14:355–65.
8. Agarwal D, Ahmad S, Singh JV, Shukla M, Kori B, Garg A. Prevalence of risk factors of non-communicable diseases in a rural population of Eastern Uttar Pradesh. *Int J Med Dent Sci* 2018;7:1667–75.

9. Dandona L, Dandona R, Camara B, Dave PV, Dey S, Ghoshal AG, *et al.* Nations within a nation: Variations in epidemiological transition across the states of India, 1990–2016 in the Global Burden of Disease Study. *Lancet* 2017;390:2437–60.
10. Sathish T, Kannan S, Sarma SP, Razum O, Sauzet O, Thankappan KR. Seven-year longitudinal change in risk factors for non-communicable diseases in rural Kerala, India: The WHO STEPS approach. *PLoS One* 2017;12:e0178949.
11. Tondare MB, Havale NG, Bedre RC, Kesari P. Prevalence of risk factors of non communicable diseases among rural population of Bidar. *Int J Community Med Public Health* 2017;4:2681–5.
12. Vijayakarhikeyan M, Krishnakumar J, Umadevi R. Cross-sectional study on the prevalence of risk factors for non-communicable disease in a rural area of Kancheepuram, Tamil Nadu. *Int J Community Med Public Health* 2017;4:4600–7.
13. Kahar P, Misra R, Patel TG. Sociodemographic Correlates of Tobacco Consumption in Rural Gujarat, India. *Biomed Res Int.* 2016;2016:5856740.
14. Oommen AM, Abraham VJ, George K, Jose VJ. Prevalence of risk factors for non communicable diseases in rural & urban Tamil Nadu. *Indian J Med Res* 2016;144:460–71.
15. Kumar R. Anthropometric and behavioral risk factor for non-communicable diseases: A cluster survey from rural Wardha. *Indian J Public Health* 2015;59:61–4.
16. Anjana RM, Pradeepa R, Das AK, Deepa M, Bhansali A, Joshi SR, *et al.* Physical activity and inactivity patterns in India-Results from the ICMR-INDIAB study. *Int J Behav Nutr Phys Act* 2014;11:26.
17. Ghorpade AG, Majgi SM, Sarkar S, Kar SS, Roy G, Ananthanarayanan PH, *et al.* Diabetes in rural Pondicherry, India: A population-based study of the incidence and risk factors. *WHO South-East Asia J Public Health* 2013;2:149–55.
18. Joshi R, Taksande B, Prakash Kalantri S, Narayan Jajoo U, Gupta R. Prevalence of cardiovascular risk factors among rural population of elderly in Wardha district. *J Cardiovasc Dis Res* 2013;4:140–46.
19. Liu S, Manson JE, Lee I, Cole SR, Hennekens CH, Willett WC, *et al.* Fruit and vegetable intake and risk of cardiovascular disease: The Women's Health Study. *Am J Clin Nutr* 2000;72:922–28.
20. Puducherry District Population Census 2011-2019, Puducherry literacy sex ratio and density. Available from: <https://www.census2011.co.in/census/district/482puducherry.html>.
21. Cigarettes and Other Tobacco Products Act (COTPA), 2003 Available from: <https://www.tobaccocontrolaws.org/files/live/India/India%20.%20COTPA.pdf>.

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