A Comparative Study of Cardiovascular Disease Risk Factors among Rural and Urban Population of Karbi Anglong, Assam

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How to citation this article: Mousumi Goswami, Deepak Choudhury, Ananta Das, Anurag Yadav, "A Comparative Study of Cardiovascular Disease Risk Factors among Rural and Urban Population of Karbi Anglong, Assam", IJMACR- June - 2025, Volume – 8, Issue - 3, P. No. 01 – 07.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Noncommunicable diseases (NCDs), particularly cardiovascular diseases (CVDs), are leading contributors to global mortality, driven by preventable risk factors such as elevated blood pressure, high cholesterol, and unhealthy lifestyles. In developing countries like India, rapid urbanization and the adoption of Western lifestyles have led to an increased prevalence of CVD risk factors. However, limited data exists on the comparative distribution of these risk factors in rural and urban populations, particularly in northeastern India. This study aimed to compare cardiovascular disease risk factors, including metabolic and lipid profiles, between rural and urban populations in the Karbi Anglong District.

Material & Method: A prospective observational study included 200 participants, equally divided between rural and urban groups. Data on demographics, physical characteristics, habits, and comorbidities were collected. Blood samples were analyzed for random blood sugar (RBS) and lipid profiles. Statistical analysis was performed using SPSS v23.0, with a significance threshold of $p<0.05$.

Results: The study found comparable demographic and lifestyle characteristics between the groups. However, urban participants exhibited significantly higher mean levels of RBS, cholesterol, triglycerides, and LDL, and

lower HDL levels compared to rural participants (p<0.05).

Conclusion: Urban populations in the study area demonstrated a higher metabolic and lipid-related risk burden, underscoring the need for targeted public health interventions to address these disparities and promote cardiovascular health.

Keywords: Cardiovascular disease, Risk factors, Rural-urban comparison, Lipid profile, Metabolic health, Public health interventions.

Introduction

Noncommunicable diseases (NCDs) constitute a significant health burden in developed countries and are fast increasing in developing countries such as India, owing to demographic shifts and lifestyle changes.[1,2] The major NCDs include cardiovascular diseases, renal and neurological disorders, mental health conditions, musculoskeletal issues, chronic respiratory diseases, the lasting effects of accidents, age-related conditions like senility, blindness, cancers, diabetes, obesity, various metabolic and degenerative diseases, and chronic consequences of communicable diseases.[3,4]

Cardiovascular disease (CVD) encompasses a group of disorders affecting the heart and blood vessels, particularly those linked to atherosclerosis, or arterial disease.[5] It includes conditions such as arteriosclerosis, heart valve disease, coronary artery disease, arrhythmia, heart failure, orthostatic hypotension, hypertension, shock, endocarditis, diseases of the aorta and its branches, peripheral vascular disorders, and congenital heart defects. Most cardiovascular diseases are driven by common, preventable risk factors. These risk factors contribute significantly to death and disability worldwide, regardless of a country's level of economic development. The primary global risk factor is elevated

blood pressure, followed by tobacco use, high cholesterol levels, and insufficient intake of fruits and vegetables.[6,7]

The World Health Report 2022 identified numerous key risk factors for cardiovascular disease, which are divided into behavioral and biological categories. Tobacco usage, dangerous alcohol drinking, unhealthy diets with a limited intake of fruits and vegetables, and physical inactivity are all significant behavioral risk factors. Overweight and obesity, high blood pressure, elevated blood glucose levels, aberrant blood lipids, and high total cholesterol are the most significant biological risk factors.[8]

In developing countries like India, the increasing adoption of Western lifestyle habits—such as long sedentary work hours, consumption of spicy junk food, smoking, and alcohol use—has led to rising rates of obesity and a lack of physical activity, disrupting the natural circadian rhythm of life. Despite these trends, few studies have been conducted on non-communicable disease risk factors in the northeastern region of India to provide accurate data. This comparative study of urban and rural populations in the Karbi Anglong District aims to raise awareness about the risk factors for cardiovascular disease in the area. The study's goal is to identify any differences in the distribution of risk factors between rural and urban populations.

Material & Method

This prospective observational study was conducted at Diphu Medical College and Hospital institute, for a period of one year All the participants willing to be part of study were included in study. Participants not willing to be part of study, below 18yrs, pregnant women, patients on lipid altering drugs, OC pills and liver disease patients were excluded from the study.

The participants were enrolled after obtaining the informed consent. All the demographic details, physical characters such as height, weight were collected. The general physical and systemic examination was done. The patients blood sample was collected under all aseptic precaution to perform the RBS test and lipid profile which included serum total cholesterol, triglycerides, LDL-cholesterol, HDL cholesterol and VLDL.

Statistical analysis: The data were collected in proforma and entered in excel sheet. The data were analysed using SPSS v23.0 operating on windows 10. The data were summarised and presented as mean, standard deviation,

frequency and percentage. The mean difference between continuous parameters compared using unpaired t-test and categorical data using chi-square test. For all statistical purpose a p-value of <0.05 was considered statistically significant.

Result

Present study included total of 200 participants, with 100 participants each in both the groups. The mean age between the groups were comparable with 55.6yrs in rural and 54.9yrs in urban group participants. The physical characteristics such as the height and weight were comparable between the groups.

Table 1: Comparison of mean age and physical parameters

	Rural		Urban		p-value
	Mean	SD	Mean	SD	
Age in yrs	55.6	14.2	54.9	16.8	0.86
Height in feet	5.32	.27	5.34	.28	0.74
Weight in kgs	54.8	9.5	54.3	7.9	0.79

Table 2: Comparison of gender, habits and co-morbidities between groups

		Rural		Urban		Chi-square (p-value)
		Count	N %	Count	N %	
Gender	Female	38	38.0%	43	43.0%	0.18 (0.67)
	Male	62	62.0%	57	57.0%	
Smoking	No	76	76.0%	67	67.0%	0.83 (0.36)
	Yes	23	23.0%	33	33.0%	
Alcohol	No	46	46.0%	67	67.0%	3.55 (0.06)
	Yes	54	54.0%	33	33.0%	
Tobacco habit	No	43	43.0%	59	59.0%	1.91 (0.167)
	Yes	57	57.0%	41	41.0%	
Family History	No	100	100.0%	97	97.0%	1.06 (0.30)
	Yes	0	0.0%	3	3.0%	
Diet	Non-Vegetarian	94	94.0%	97	97.0%	0.29 (0.59)
	Vegetarian	6	6.0%	3	3.0%	

Exercise	No	100	100.0%	100	100.0%	-
DM	No	84	84.0%	81	81.0%	0.16 (0.68)
	Yes	16	16.0%	19	19.0%	
HTN	No	48	48.0%	56	56.0%	0.49 (0.48)
	Yes	52	52.0%	44	44.0%	

Gender distribution between the groups were comparable with overall male preponderance in the present study, Also, the habits such as smoking, alcohol, tobacco chewing were comparable between the groups. The family history, diet habits and comorbidities were also comparable between the groups.

Table 3: Comparison of the RBS and lipid parameters

| | Rural | | Urban | | p-value |
	Mean	SD	Mean	SD	
RBS mg/dl	117.37	59.06	148.32	88.46	0.05*
Cholesterol mg/dl	131.9	49.5	168.9	45.5	0.05*
Triglyceride mg/dl	133.1	70.7	170.7	57.0	0.05*
HDL mg/dl	39.86	16.11	32.93	11.23	0.05*
LDL mg/dl	75.4	43.7	98.4	48.9	0.05*
VLDL mg/dl	25.5	14.6	32.0	11.4	0.417

On assessment of the blood random sugar level and lipid profile, there is significant difference noted between the groups. The mean RBS, cholesterol, triglycerides, and LDL were significantly higher among the urban participants compared to the rural participants. Similarly, the mean HDL was significantly lower among urban compared to rural participants. (p<0.05)
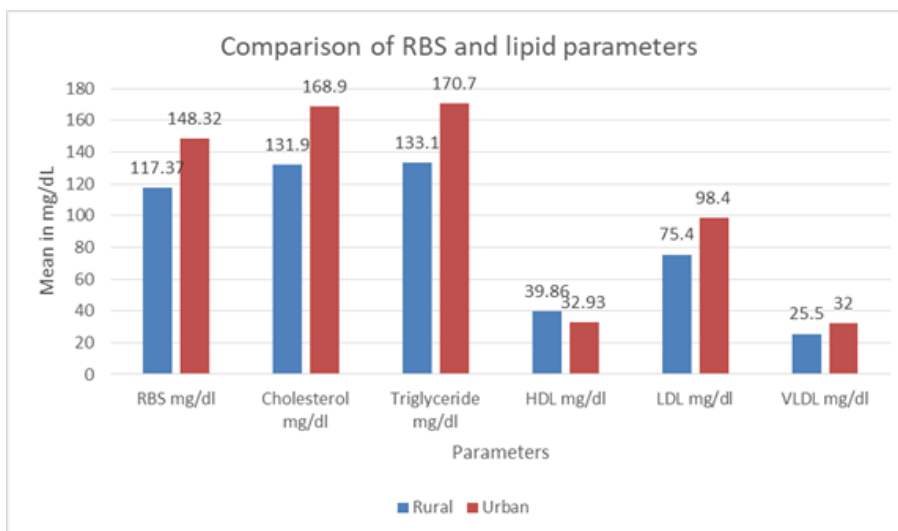

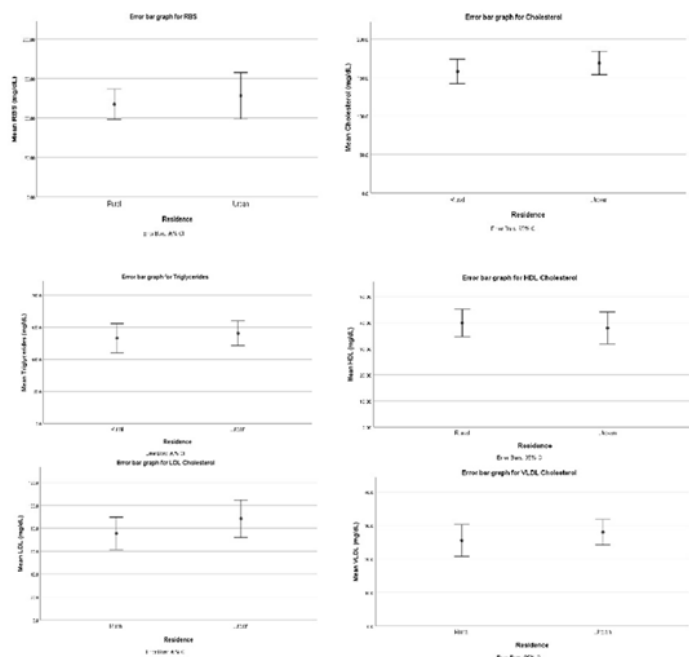Figure 1: Comparison of the RBS and lipid parameters

Figure 2: Error bars for the parameters by residence

Discussion

Cardiovascular disease (CVD) remains a leading cause of morbidity and mortality worldwide, with risk factors varying significantly across different populations. The urban-rural divide presents unique challenges in understanding and addressing these risks, as lifestyle, access to healthcare, socioeconomic factors, and environmental influences differ substantially between the two settings. While urban populations often face risks associated with sedentary lifestyles, processed diets, and stress, rural populations may encounter challenges related to limited healthcare access, lower health literacy, and different dietary patterns. This comparative study aims to explore the prevalence and distribution of cardiovascular risk factors among rural and urban populations, providing insights that can guide targeted interventions and health policies to mitigate CVD risk in diverse demographic settings.

Present study included total of 200 participants, with 100 participants each in both the groups. The mean age between the groups were comparable with 55.6yrs in rural and 54.9yrs in urban group participants. The physical characteristics such as the height and weight were comparable between the groups. Gender distribution between the groups were comparable with overall male preponderance in the present study, Also, the habits such as smoking, alcohol, tobacco chewing were comparable between the groups. The family history, diet habits and comorbidities were also comparable between the groups.

Similar to current study Singh RB et al., documented with the comparable mean age between the groups and also the other demographic details and physical characteristics.[9] In concordance Uchariya MS et al., documented with comparable mean age between the groups and overall male preponderance in their study.[10] Similar to present study Kodaman N et al., documented comparable mean age between the rural and urban population. There is significant higher BMI and blood pressure among urban population compared to rural.[11]

In contrast study by Junapudi SS et al., there was significant higher incidence of obesity and diabetes mellitus among the urban population compared to the rural population, due to the sedentary lifestyle with minimal to nill physical activity.[12] However in study by Roshidi CH et al., documented with significant higher incidence of the hypertension among rural population.[13]

On assessment of the blood random sugar level and lipid profile, there is significant difference noted between the groups. The mean RBS, cholesterol, triglycerides, and LDL were significantly higher among the urban participants compared to the rural participants. Similarly, the mean HDL was significantly lower among urban compared to rural participants. (p<0.05) In line with present study Uchariya MS et al., documented with the significantly higher cholesterol and LDL levels and significantly lower mean HDL among the urban population compared to the rural population. Also, in study by Eliasson M et al., the lipid profile was deranged with significant higher mean cholesterol levels among the urban population compared to rural population.[14]

In concordance to present study Kodaman N et al., documented with significant derangement in lipid profile parameters between the rural and urban population. The mean level of LDL, total cholesterol, triglycerides and RBS was found to be significantly higher among urban population and mean HDL level was significantly lower among urban population compared to rural population.[11]

Conclusion

In conclusion, this comparative study of cardiovascular disease risk factors between rural and urban populations provides valuable insights into the differences in metabolic and lipid profiles across the two groups. While physical characteristics, gender distribution, habits, family history, diet habits, and comorbidities were comparable, significant variations were observed in blood random sugar levels and lipid profiles. Urban participants demonstrated higher mean levels of random blood sugar, cholesterol, triglycerides, and LDL, along with significantly lower HDL levels compared to their rural counterparts. These findings highlight the greater metabolic and lipid-related risk burden among urban populations, likely influenced by lifestyle and dietary patterns. The results underscore the importance of tailored public health interventions and preventive strategies to address the unique cardiovascular risk factors in both rural and urban settings, promoting equitable and effective healthcare outcomes.

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