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Comprehensive Assessment of Hypertension and Cardiovascular Risk Factors in a Rural Military Population: A Cross-Sectional Study

Dr Sidhartha Sankar Kuanr[1], Dr Snehalata Mallick[2], Dr Satya brata Thakur[3] and Dr. Saroj Kumar Das[4]

[1]Assistant Professor, Department of Paediatrics, SVPPGIP/ SCB Medical college & Hospital, Cuttack, Odisha

[2]Assistant professor department of O&G PRM Medical College and Hospital, Baripada, Odisha

[3]Assistant professor, Department of Microbiology Veer Surendra Sai Institute of Medical Sciences and Research (VIMSAR), Burla, Odisha

[4]Assistant Professor, Department of Radiotherapy, MKCG Medical College and Hospital, Berhampur, Odisha

Corresponding Author: Dr. Saroj Kumar Das,dasdrsaroj2019@gmail. Com

Abstract:

Background:Hypertension is a prominent non-communicable disease globally, contributing significantly to cardiovascular disorders, strokes, renal failure, and premature mortality. This study addresses the pressing health concern of hypertension's impact, particularly in the context of a rural military population.

Objective:To assess the prevalence of hypertension and patterns of associated cardiovascular and metabolic risk factors in individuals serving in the military in a rural setting.

Methods:A cross-sectional study was conducted at Tertiary Medical College Hospital, Sriram Chandra Bhanj Medical College & Hospital, Cuttack, from August 2020 to September 2021. Data were collected from 136 participants using purposive sampling, following JNC-7 criteria for hypertension screening. A mixed-method approach, including qualitative and quantitative techniques, was employed through a pre-designed questionnaire. Data were coded and analyzed using R software, incorporating descriptive and inferential statistics.

Results: The age distribution revealed a majority in the 36-55 years group (48.5%). The gender distribution favored males, with 10.3% newly detected hypertension cases. Controlled hypertension was observed in 62% of cases. Dyslipidemia was prevalent, with 50.7% having elevated LDL and 58.1% showing reduced HDL. Ischemic heart disease distribution indicated 74.2% with myocardial ischemia. BMI analysis identified 68 cases as overweight. Diabetes mellitus was present in 61% of participants.

Discussion: Comparisons with other studies showed variations in CVD risk factors, emphasizing the influence of demographic and regional factors. Discrepancies in pre-obesity and hypertension prevalence were noted, suggesting the need for tailored interventions. The study highlighted the interconnected nature of cardiovascular and metabolic risk factors, necessitating comprehensive preventive strategies.

Conclusion: The study suggests that primary preventive measures have been successful in reducing certain risk factors. However, challenges such as pre-obesity and variations in lipid profile and glycemic status call for a reevaluation of medical examination standards. The importance of revising recommendations related to obesity and hypertension, coupled with continuous monitoring, is emphasized for effective disease prevention in this rural military population.

Keywords: Hypertension, Cardiovascular Disorders, Prevalence, Cross-Sectional Study, Rural Population, Body Mass Index, Diabetes Mellitus

INTRODUCTION:

Hypertension stands as a pivotal non-communicable disease (NCD) on a global scale, contributing significantly to the onset of cardiovascular disorders (CVDs), severe strokes, renal failure, and premature mortality, making it a pressing health concern.[1–3] The World Health Organization (WHO) identifies hypertension as a major contributor to the global burden of disease, ranking it third in disability-adjusted life-years (DALYs).[4]

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The impact of CVDs is staggering, accounting for approximately 17 million fatalities worldwide, with 9.4 million deaths attributed to hypertension alone. Notably, 80% of CVD-related fatalities occur in developing nations, underscoring the urgency of addressing hypertension as a global health priority.[5-7]

Projections indicate a worrisome trajectory, with the global prevalence of hypertension expected to increase from 26% in 2000 to 29.2% by 2025, encompassing over 29% of the world's population. While high blood pressure is more prevalent in affluent nations, its prevalence is on the rise in low- and middle-income countries (LMICs).8 Southeast Asian countries, in particular, are grappling with a burgeoning burden of hypertension and associated CVDs.[9–11] The World Health Organization highlights that hypertensive diseases, affecting more than 35% of adult populations, have become a significant health challenge in the Asian region.[12]

The initial documentation of hypertension prevalence dates back to 1976 when it was reported at 1.10%. Subsequent studies reveal varying prevalence rates, with one meta-analysis indicating 11.3%, a population-based investigation reporting 18.6%, and a recent survey showing 20.1%. In India, these statistics translate into considerable health implications, with diseases resulting from hypertension accounting for 7% of fatalities among individuals aged 25 years or older, affecting approximately 9.6 million people.[13-14]

In summary, hypertension emerges as a critical global health issue, exerting a profound impact on cardiovascular health and mortality rates. As prevalence continues to rise, particularly in LMICs, urgent and comprehensive strategies are imperative to mitigate the escalating burden of hypertension and its associated complications. The significance of addressing this health challenge is underscored by its ranking among the top contributors to the global burden of disease, emphasizing the need for concerted efforts in research, prevention, and management.

Objective:
The primary aim of this study is to evaluate the prevalence of hypertension and the patterns of associated cardiovascular and metabolic risk factors among the rural population of Cuttack.

Methodology:
This study employed a cross-sectional design to gather data from individuals at Tertiary Medical College Hospital, Sriram Chandra Bhanj Medical College & Hospital in Cuttack. The data collection period spanned from August 2020 to September 2021.

The study population consisted of 136 individuals who were screened for hypertension based on the criteria outlined in the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7). Those with systolic blood pressure ≥ 140 mmHg, diastolic blood pressure ≥ 90 mmHg, or those taking antihypertensive medications were included in the study. The sample was selected using purposive sampling in accordance with the inclusion criteria.

Data were collected using a mixed-method approach, incorporating both qualitative and quantitative techniques through a pre-designed questionnaire. The questionnaire was meticulously developed through a thorough review of existing literature and consultations with medical research experts.

Subsequently, all collected data underwent coding and were input into R software for comprehensive analysis. The analysis encompassed both descriptive and inferential statistics. Descriptive statistics, such as frequency distribution, percentage, mean, and standard deviation, were utilized alongside graphical representations, tables, and figures. Inferential statistics were also conducted to draw meaningful conclusions from the data.

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RESULTS:

A total of 136 study participants were included in the analysis. Table 1 presents the age distribution of patients, revealing that the majority (48.5%) fall within the 36-55 years age group, followed by 43.4% in the 15-35 years age group. Additionally, 6.6% of cases belong to the 56-75 years age group, and 1.5% are in the >76 years age group.

Table-1: Sociodemographic characteristics of the study participants

Characteristics		Frequency	Percentage
Age group	15-35 years	59	43.4
	36-55 years	66	48.5
	56-75 years	9	6.6
	>76 years	2	1.5
Gender	Male	100	73.5
	Female	36	26.5
Hypertension	Newly detected	14	10.3
	Known cases	122	89.7

Table 1 also details the gender distribution of patients, highlighting a higher prevalence among males. The distribution based on hypertension (HTN) prevalence indicates that 10.3% of cases were newly detected, while 89.7% were known cases. Figure 1 illustrates the distribution of patients based on HTN prevalence, indicating that 62% had controlled hypertension, 11% had uncontrolled hypertension, and 5% exhibited systolic hypertension.

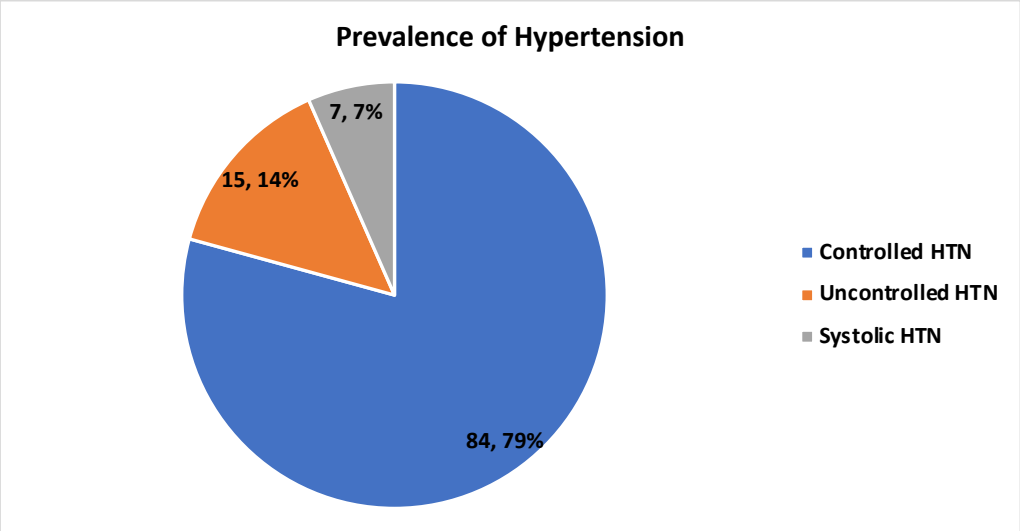

Figure-1: Distribution of the patients according to prevalence of hypertension (HTN)

Figure 2 presents the distribution of ischemic heart disease based on electrocardiogram (ECG) findings, with 74.2% exhibiting myocardial ischemia and 25.8% having old myocardial infarction (MI).

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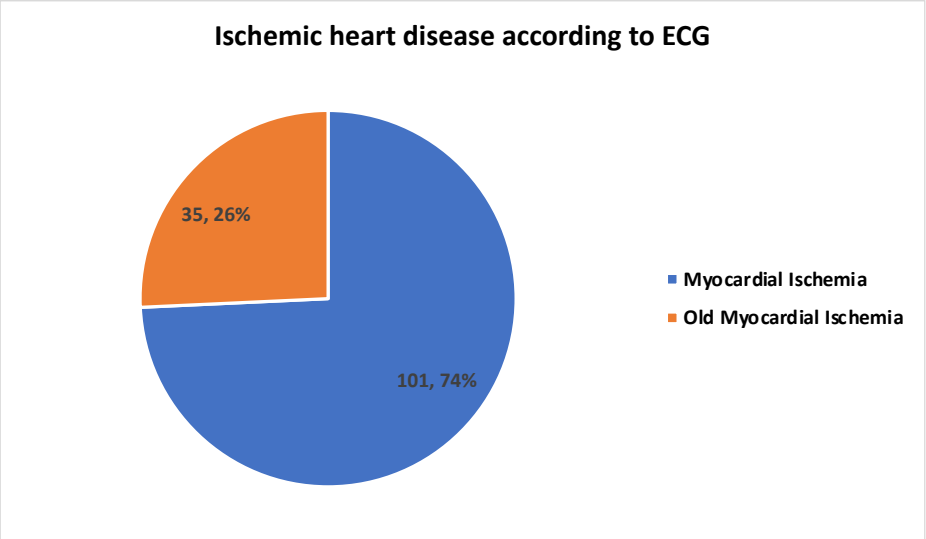

Figure 2: Distribution of ischemic heart disease according to ECG where according to ECG

Table 2 outlines the distribution of patients according to body mass index (BMI), revealing that 68 cases fall within the overweight category, 54 have a normal BMI, 13 are classified as obese, and 1 is underweight.

Table-2: Distribution of patients according to BMI.

BMI		Frequency	Percentage
Underweight	18.5	1	0.7
Normal	18.5-24.9	54	39.7
Over-weight	25-29.9	68	50.0
Obese	30 & >30	13	9.6

Figure 3 illustrates the distribution of patients based on hypertension staging, with 45% classified as stage-1 hypertension and 55% as stage-2 hypertension.

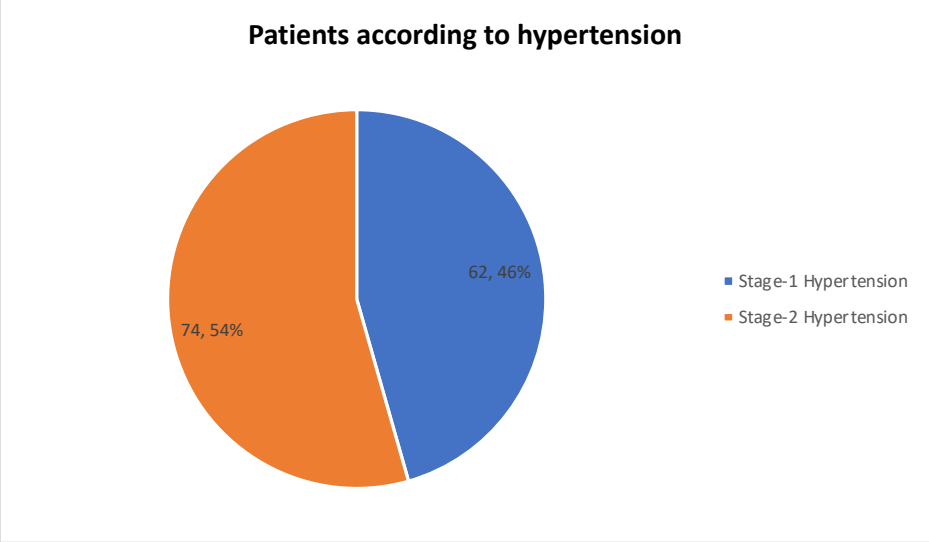

Figure-3: Distribution of the patients according to hypertension

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Table 3 provides a detailed distribution of patients according to lipid profile and glycemic status, indicating that 50.7% had raised low-density lipoprotein (LDL), 58.1% had low high-density lipoprotein (HDL), and 61% had diabetes mellitus.

Table-3: Distribution of the patients according to lipid profile and glycemic status

Lipid Profile	Frequency	Percentage
Raised LDL	69	50.7
Low HDL	79	58.1
Raised TG	57	41.9
Diabetes Melitus	83	61.0
Impaired glucose tolerance (IGT)	24	17.6
Impaired fasting glycemia (IFG)	29	21.3

Table 4 presents the correlation among risk factors of ischemic heart disease (IHD), demonstrating a strong correlation between IHD and raised LDL (p=0.001), low HDL (p=0.002), overweight (p=0.001), and the incidence of diabetes mellitus (p=0.002).

Table 4: Correlation among risk factors of Ischemic heart disease (IHD)

Risk factors	P value
1. Family H/o IHD positive	0.003
2. Gender:	
Male	0.004
Female	0.002
3. Diabetes Melitus	0.002
4. Overweight	0.001
5. Tobacco Consumption	0.405
6. Smoking	0.240
7. Raised LDL	0.001
8. Low HDL	0.002
9. Raised TG	0.102

DISCUSSION:

In our study, the observed prevalence of high cholesterol was notably lower at 0.7%, in stark contrast to the 1.4% projected in a prior research study.15 Our findings revealed a substantial burden of dyslipidemia, with 50.7% exhibiting elevated low-density lipoprotein (LDL) levels and 58.1% having reduced high-density lipoprotein (HDL). Additionally, three participants in our study exhibited high fasting blood glucose levels. These results highlight a concerning landscape of cardiovascular and metabolic risk factors in the studied population.

Comparisons with other studies underscore the variability in prevalence rates across different regions and populations. Notably, one research study reported a higher prevalence of cardiovascular disease (CVD) risk factors, including smoking (18%), pre-obesity (31%), and pre-hypertension (80%). In contrast, our study demonstrated a lower prevalence of pre-obesity (15.2%) and a more balanced distribution of hypertension, with 46% in stage 1 and 54% in stage 2. Similarly, the prevalence of smoking in our study mirrored the previously reported 18%. These variations could be attributed to differences in demographic profiles, lifestyle choices, and regional disparities.[16-17]

Comparing our study with research conducted in southern India, discrepancies in the prevalence of hypercholesterolemia, pre-hypertension, and hypertension were evident. Our study, focused on individuals

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in the military services, revealed a significant burden of pre-obesity, emphasizing the importance of reevaluating optimal weight parameters based on body mass index (BMI) for Asians in military settings. This is particularly relevant for age groups above 30 years, where the likelihood of developing cardiovascular diseases (CVDs) is heightened.[17]

The correlation between ischemic heart disease (IHD) and dyslipidemia in our study further substantiates existing evidence, with a strong link observed between IHD and elevated LDL (p=0.001), low HDL (p=0.002), excess weight (p=0.001), and the incidence of diabetes mellitus (p=0.002). These findings underscore the interconnected nature of cardiovascular and metabolic risk factors, necessitating comprehensive preventive strategies.

Importantly, many of these risk factors remain hidden, only manifesting during catastrophic events such as acute coronary syndrome or stroke. The latent nature of these disorders emphasizes the critical need for regular public health monitoring of CVD risk factors rather than relying on opportunistic screening. A proactive approach to identifying and addressing these risk factors is essential for preventing adverse cardiovascular events and reducing the overall burden of CVD in the studied population and beyond.

Our study sheds light on the prevalence of cardiovascular and metabolic risk factors in a military population, emphasizing the need for tailored interventions and continuous monitoring to mitigate the impact of these factors on cardiovascular health. These findings contribute valuable insights to the broader understanding of CVD risk factors, urging a proactive stance in public health initiatives and policy formulation.

CONCLUSION:

Based on our findings, it can be inferred that the reduced levels of identified risk factors indicate the success of primary preventive measures. Nevertheless, challenges such as pre-obesity and variations in lipid profile and glycemic status highlight the necessity for a reevaluation of medical examination standards. This underscores the importance of revising recommendations related to obesity and hypertension, focusing on early interventions to address these issues at their onset. The study underscores the significance of continuous monitoring and adaptability in healthcare guidelines to effectively target emerging health concerns and ensure a proactive approach to disease prevention.

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