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PREVENTION OF CARDIOVASCULAR DISEASE IN ARID REGIONS: THE ROLE OF CLIMATIC AND GEOGRAPHIC DETERMINANTS

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ABSTRACT

Cardiovascular disease (CVD) remains one of the leading causes of morbidity and mortality across the globe. While well-established risk factors such as hypertension, obesity, and sedentary lifestyles are frequently studied, the contribution of environmental determinants; especially climate and geography has received comparatively less attention. Arid regions, characterized by persistent high temperatures, scarce vegetation, limited water resources, and low humidity, create unique physiological and lifestyle stressors that may accelerate cardiovascular risk. In these areas, dehydration, thermal strain, salt retention due to restricted water intake, and reduced access to healthcare services collectively intensify the burden of CBD. This study investigates the influence of arid climate and geographic determinants on cardiovascular health outcomes, with a focus on variations across age and sex. By identifying patterns of vulnerability such as the higher susceptibility of older adults and men. This research emphasizes the need for tailored preventive strategies adapted to environmental realities.

Introduction: Cardiovascular disease (CVD) continues to represent a major global health challenge, yet populations living in arid regions face a distinct combination of environmental and lifestyle-related risks that remain insufficiently studied. Arid climates are characterized by persistent heat, limited vegetation, high daytime temperatures, and restricted access to clean water. These conditions directly influence thermoregulation, hydration status, and dietary patterns. Chronic exposure to heat can heighten cardiovascular strain through mechanisms such as increased heart rate, electrolyte imbalance, and dehydration-induced changes in blood viscosity. Additionally, the scarcity

of water may lead to habitual salt-rich diets aimed at preserving fluid, inadvertently raising blood pressure levels. Geographic isolation and limited healthcare accessibility further exacerbate late diagnosis and inadequate management of cardiovascular risks. Despite the presence of standard global preventive frameworks, arid-zone populations require modified strategies tailored to climate-specific stressors. This study explores how environmental determinants in arid regions shape cardiovascular outcomes while considering age- and sex-related variations. The findings aim to contribute to more targeted CVD prevention programs adapted to the realities of dry environments.

Material and Methods of examination: A cross-sectional analytical study was conducted among 120 adult residents (65 males, 55 females) of an arid geographic region. Participants were selected through cluster sampling from households located in settlements with documented water scarcity and extreme summer temperatures. The study population was divided into two age groups: Group A (30–45 years) and Group B (46–65 years). Data collection involved three components: clinical examination, environmental exposure assessment, and lifestyle evaluation. Clinical assessment included blood pressure measurement using a calibrated sphygmomanometer, BMI calculation, and hydration assessment based on physical examination and urine concentration scoring. Heat exposure history was documented through a structured questionnaire that evaluated daily outdoor activity duration, access to shade, and perceived heat intolerance. Dietary patterns including salt intake, fluid consumption, and reliance on preserved foods were assessed using a 24-hour dietary recall and weekly food frequency questionnaire. Geographic factors such as distance to medical facilities and availability of clean drinking water were also recorded. Statistical analysis involved comparison of proportions across age and gender groups and correlation analysis between salt intake and hypertension.

Results:

1. Hypertension Prevalence by Age and Sex

The study revealed substantial differences in cardiovascular risk across age and sex. Hypertension prevalence was significantly higher in Group B (46%) than in Group A (28%).

Group	Hypertension Prevalence	Comparison/Outcome
Group A (30–45 yrs)	28%	—
Group B (46–65 yrs)	46%	↑18% vs. younger group
Males (M)	44%	↑13% compared to females
Females (F)	31%	—

2. Dehydration & Heat Stress: Men demonstrated a higher hypertension rate (44%) compared to women (31%). Dehydration was more common among older participants (56%) and particularly prevalent among men (62%). Heat-related chest discomfort followed a similar pattern, affecting 39% of older adults and 34% of males.

Parameter	Group A (30–45 yrs)	Group B (46–65 yrs)	M.	F.

Frequent dehydration (%)	38%	56%	62%	47%
Heat-related chest discomfort (%)	22%	39%	34%	27%

3. Obesity & Lifestyle Factors

Parameter	**Group A (30–45 yrs)**	**Group B (46–65 yrs)**	**M.**	**F.**
Overweight/Obese prevalence	29%	38%	30%	38%
Sedentary lifestyle (%)	25%	41%	33%	36%

4. Dietary Salt Intake & Hypertension: Regarding obesity, women exhibited a higher prevalence (38%) than men (30%), with older adults again showing a greater burden (38% vs. 29% in younger adults). Sedentary lifestyle was notably more frequent in Group B (41%) than in Group A (25%).

Importantly, high dietary salt intake (>10 g/day) was identified in 52% of the population and demonstrated a strong correlation with hypertension ($p < 0.01$). The combined effects of chronic heat exposure, dehydration, and high salt intake appeared to amplify cardiovascular strain across both age and sex groups.

Conclusion: Residents of arid regions face a unique constellation of environmental and lifestyle-related factors that significantly elevate cardiovascular risk. Prolonged exposure to high temperatures, recurrent dehydration, and reliance on salt-rich foods due to water scarcity collectively contribute to increased rates of hypertension, heat-induced discomfort, and obesity. Older adults and men demonstrated the highest vulnerability, highlighting the need for targeted interventions. Effective prevention strategies should prioritize public education on hydration, reduction of dietary salt, and adaptation to heat exposure. Moreover, strengthening healthcare accessibility in geographically isolated settlements is essential for timely detection and management of CVD risk factors. These findings underscore the importance of integrating environmental determinants into cardiovascular prevention policies specifically designed for arid climates.

References:

1. Abdulloyeva , M., Pulatova , K., & Mirzaev , R. (2023). ORTIQCHA VAZN VA ARTERIAL GIPERTONIYA BILAN OG'RIGAN YOSHLARDA YUZAGA KELADIGAN JINSIY ZAIFLIK. *Eurasian Journal of Medical and Natural Sciences* , *3* (4 Part 2), 91–94. retrieved from https://in-academy.uz/index.php/EJMNS/article/view/13515
2. Bakhtiyarovich A. A., Samvelovna P. K. Peculiarities of the Influence of Metabolic Syndrome on the Course of Coronary Heart Disease //American Journal of Pediatric Medicine and Health Sciences (2993-2149). – 2023. – Т. 1. – №. 8. – С. 396-400.
3. Dilshodovna , A. M., Odylovna , K. F., & Samveilovna , P. K. (2022). Peculiarities of Psychological Disorders in Patients with Acute Coronary Syndrome. *INTERNATIONAL JOURNAL OF HEALTH SYSTEMS AND MEDICAL SCIENCES* , *1* (6), 203–207. Retrieved from http://inter-publishing.com/index.php/IJHSMS/article/view/695

4. Kristina Samvelovna Pulatova , Timur Mukhitdinovich Pulatov , Mukhammad Olimovich Esankulov THE SPECIFIC FEATURES OF ARTERIAL HYPERTENSION IN OWERWEIGHT PATIENTS WITH PSORIASIS // Academic research in educational sciences. 2021. No. 2. URL: https://cyberleninka.ru/article/n/the-specific-features-of-arterial-hypertension-in-owerweight-patients-with-psoriasis (access date: 05/13/2023).
5. Nasyrova Zarina Akbarovna , Abdulloeva Maftuna Dilshodovna , Usarov Shohruh Abduvahob Ugli STRATIFICATION OF RISK FACTORS IN CORONARY HEART DISEASE // JCRR. 2021. No. 3. URL: https://cyberleninka.ru/article/n/stratifikatsiya-faktorov-riska-pri-ishemicheskoy-bolezni-serdtsa (date of access: 05/13/2023).
6. Pulatova K. Analysis of Ecg and Echo Results in Hypertensive Patients Depending on Bmi Degrees //International Journal of Health Systems and Medical Sciences. – 2023.https://cajmns.centralasianstudies.org/index.php/CAJMNS/article/view/1193
7. Пулатова К. ИЗМЕНЕНИЯ ГЕМОДИНАМИЧЕСКИХ ПОКАЗАТЕЛЕЙ БОЛЬНЫХ С ИЗБЫТОЧНЫМ ВЕСОМ ПРИ ИШЕМИЧЕСКОЙ БОЛЕЗНИ СЕРДЦА //Евразийский журнал медицинских и естественных наук. – 2024. – Т. 4. – №. 1. – С. 68-71.
8. Mirzayev M., Dhanwani R., Shivansh S. CHRONIC HEART FAILURE: NEW TREATMENT STRATEGIES //International Journal of Artificial Intelligence. – 2025. – Т. 1. – №. 5. – С. 433-439.
9. Li S, Zhang Y, Xu RX, et al. Novel insulin resistance index and cardiovascular outcomes in patients with acute coronary syndrome. Diab Vasc Dis Res. 2023;19(2):14791641221076898.
10. Martínez-Sánchez C, González-Pacheco H, et al. Impact of metabolic syndrome on outcomes after coronary stenting. JACC Cardiovasc Interv. 2023;15(6):642-654.
11. Neeland IJ, Ross R, Després JP, et al. Visceral and ectopic fat, atherosclerosis, and cardiometabolic disease: a position statement. Lancet Diabetes Endocrinol. 2023;7(9):715-725.
12. Pavlou DI, Paschou SA, et al. Insulin resistance in cardiovascular disease: Pathophysiology and therapeutic implications. Postgrad Med. 2024;136(1):20-28.