

AN OBSERVATIONAL STUDY ON CARDIOVASCULAR HEALTH AMONG SECURITY GUARDS IN SANGLI CITY

Dr. Vishagh Nair¹, Gaurav Mangale^{2*}, Dr. Sneha Katke³, Dr. Manalee Kadam⁴, Dr. Shreya Gadre⁵

¹HOD Of Cardiovascular And Respiratory Physiotherapy. Vishagh.nair@bharatividyaapeeth.edu ORCID: 0000-0002-1369-9127

²BPTH Intern, Bharati Vidyapeeth (Deemed to be University) School of Physiotherapy, Sangli, Maharashtra, India. gauravmangale15@gmail.com ORCID: 0009-0005-9810-8208

³Principal Of Bharati Vidyapeeth (Deemed To Be University) School Of Physiotherapy, Sangli. Sneha.katke@bharatividyaapeeth.edu, ORCID : 0000-0003-4388-4232

⁴MPT Cardiovascular And Respiratory Physiotherapy, Assistant Professor Department of Cardiovascular And Respiratory Physiotherapy, kadammanalee@gmail.com. ORCID : 0009-0000-3457-2339

⁵MPT Cardiovascular And Respiratory Physiotherapy, Assistant Professor Department of Cardiovascular And Respiratory Physiotherapy, shreyagadre26@gmail.com , ORCID: 0009-0004-1685-3590

ABSTRACT

Background: Cardiovascular disease (CVD) is a leading cause of disability and early mortality in India, with prevalence rising significantly in recent decades. Security guards represent a unique occupational group facing specific stressors, including irregular hours and environmental exposure, yet they remain under-researched regarding cardiovascular health. This study aims to evaluate cardiovascular risk and heart rate recovery (HRR) among security guards in Sangli City.

Methods: An observational study was conducted involving 180 security guards (aged 25–60 years) in Sangli, India. Cardiovascular risk was assessed using the QRISK Calculator, while functional capacity and autonomic recovery were measured using the YMCA Step Test (3-minute duration). Heart rate recovery was classified using the BEATS model.

Results: Of the 180 participants, 68.9% were male and 31.1% were female. QRISK scoring classified 35.6% (n=64) of participants as "High Risk" for CVD, while 51.1% (n=92) were "Low Risk." In terms of heart rate recovery, only 30% demonstrated "Great" or "Good" recovery. Conversely, 31.1% fell into the "Need Significant Improvement" category, and 12.8% "Needed Improvement." Analysis of substance use among the 90 participants reporting addictions revealed high prevalence of smoking (26.67%) and tobacco chewing (20%).

Conclusion: A substantial proportion of security guards in Sangli City exhibit high cardiovascular risk and suboptimal heart rate recovery. These findings highlight an urgent need for targeted occupational health interventions, including lifestyle modification and preventive physiotherapy, to manage cardiovascular risk in this vulnerable workforce ‘

KEYWORDS: QRISK Calculator , YMCA Step test , Heart Rate Recovery , Security Guards.

INTRODUCTION

Cardiovascular disease (CVD) is a primary driver of global disability and early mortality¹. In India, the burden of CVD is escalating rapidly; estimates indicate that deaths attributed to CVD rose from 12.1 million in 1990 to 18.6 million in 2019, with projections reaching 24 million by 2030⁴. This rising epidemic encompasses a range of conditions including coronary heart disease, cerebrovascular disease, and peripheral arterial diseases⁴.

India currently reports some of the highest rates of ST-elevation myocardial infarction (MI) and acute coronary syndrome globally⁵. Approximately 86% of CVD cases are attributable to nine major modifiable risk factors: diabetes, hypertension, smoking, abnormal lipids, obesity, poor diet, physical inactivity, alcohol use, and psychosocial stress⁶. Lower socioeconomic populations are disproportionately affected due to limited health awareness and a dietary reliance on high-cholesterol, processed foods.

Despite this high burden, security guards remain a neglected professional group within occupational health research². Their role demands constant vigilance, rapid response capabilities, and exposure to adverse weather conditions, all of which may impair cardiovascular and physical fitness². Currently, there is a paucity of data regarding the cardiovascular health of security personnel in Sangli City.

This study aims to address this gap by evaluating the cardiovascular health of security guards using two validated tools: the QRISK calculator for 10-year CVD risk estimation and the YMCA Step Test for assessing heart rate recovery (HRR). The QRISK calculator is a preferred tool as it accounts for ethnicity and socioeconomic factors, unlike many traditional calculators.

METHODOLOGY

Study Design and Setting

This observational study was conducted in Sangli City, Maharashtra. Ethical clearance was obtained from the Institutional Ethical Committee of Bharati Vidyapeeth (Deemed to be University) Medical College and Hospital, Sangli.

Participants :

A total of 180 security guards (ages 25–60 years) were recruited from various workplaces in Sangli. Participants were screened based on inclusion and exclusion criteria, and written informed consent was obtained from all subjects prior to data collection.

Instrumentation and Procedure :

1. QRISK Calculator: Used to screen for cardiovascular risk factors. This tool uses a series of questions (including age, ethnicity, smoking status, diabetes status, etc.) to provide a percentage-based estimate of the likelihood of developing CVD over the next 10 years.
2. YMCA Step Test: Used to assess Heart Rate Recovery (HRR), a marker of autonomic function and cardiovascular fitness.

Protocol: Participants were instructed to step up and down on a standard stepper for 3 minutes at a set cadence.

Measurement: Baseline heart rate was recorded before the test. Immediately upon completion (0 minutes), and at 1-minute and 2-minute intervals post-exercise, heart rates were recorded using a pulse oximeter and stopwatch.

Classification: * HRR (HEART RATE RECOVERY) results were categorized using the BEATS model.

RESULTS

Demographics:

The study included 180 participants. The gender distribution was predominantly male (n=124, 68.9%) compared to female (n=56, 31.1%).

Cardiovascular Risk (QRISK)

The QRISK assessment revealed a significant polarization in risk levels. While half the population was low risk, over one-third were classified as high risk.

Heart Rate Recovery (YMCA Step Test)

Heart rate recovery, an indicator of cardiorespiratory fitness, was classified using the BEATS model. Approximately 44% of participants showed signs of needing improvement in their recovery rates.

Habitual Risk Factors

Among the study population, 90 participants were identified as having addictive habits. The distribution of these habits is detailed below:

Table no. 1

QRISK Category	Count	Percentage
Low Risk	92	51.1%
Moderate Risk	24	13.3%
High Risk	64	35.6%

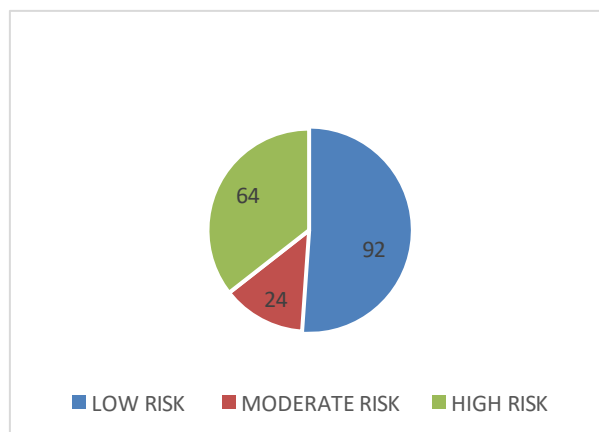
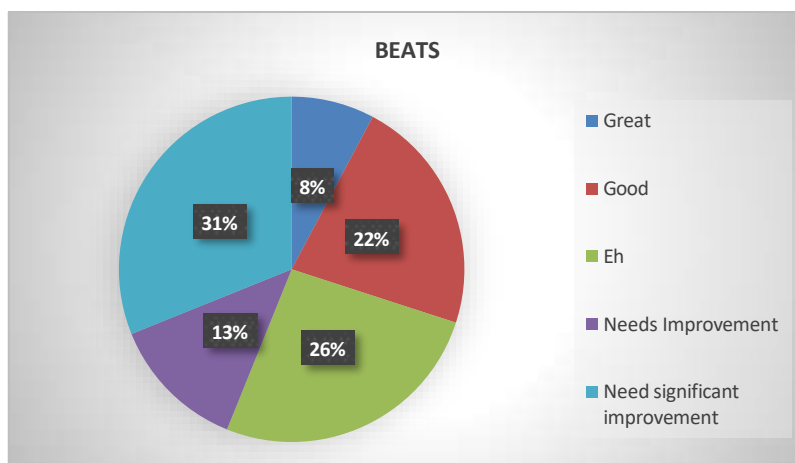


Diagram no. 1 (QRISK CALCULATOR)

Table no. 2

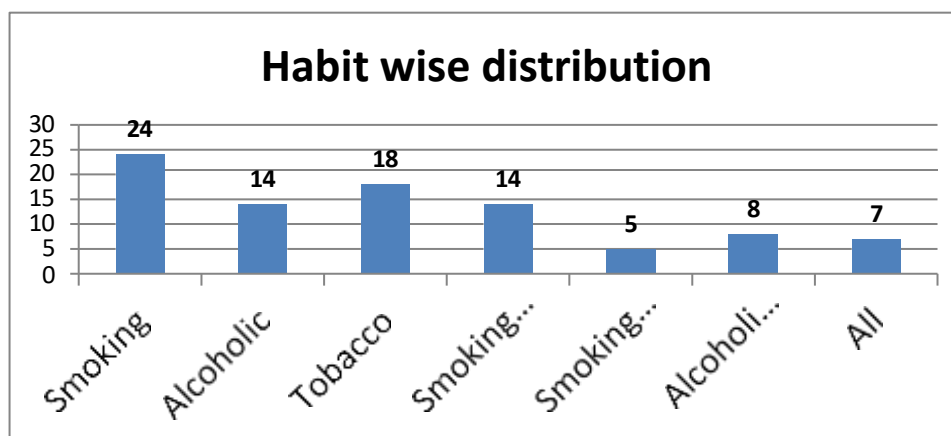
Category	Count	Percentage
Great	14	7.8%
Good	40	22.2%
Eh (Average/Borderline)	47	26.1%
Needs Improvement	23	12.8%
Need Significant Improvement	56	31.1%

YMCA STEP TEST**Diagram no.2 (YMCA STEP TEST)****DISCUSSION**

The findings of this study suggest a substantial burden of modifiable cardiovascular risk factors among security personnel in Sangli City. Notably, 35.6% of the guards were classified as "High Risk" by the QRISK calculator. This aligns with previous literature suggesting that lower socioeconomic groups often face higher CVD risks due to lifestyle factors and limited health awareness.

The YMCA Step Test results were concerning; over 70% of the guards exhibited suboptimal heart rate recovery (categories: Eh, Needs Improvement, Needs Significant Improvement). Delayed heart rate recovery is a known predictor of mortality and cardiovascular disease, often reflecting autonomic imbalance and poor vagal reactivation. Given that security work requires physical readiness, these results indicate a discrepancy between occupational demands and the physical fitness of the workforce.

The high prevalence of tobacco and smoking habits (combined >50% of the addicted subgroup) further exacerbates this risk. These lifestyle factors are well-established contributors to the CVD burden in India.

**Diagram no. 3**

Limitations

The study was observational and limited to Sangli City, which may affect generalisability. Additionally, while the YMCA test is practical for clinical settings, it is a sub-maximal test and may not capture the full extent of cardiovascular limitations compared to maximal exercise testing.

CONCLUSION

This study highlights a critical public health concern: a significant portion of the security guard workforce in Sangli City is at high risk for cardiovascular disease. The male-dominated demographic of this workforce combined with high rates of smoking, tobacco use, and poor heart rate recovery necessitates urgent intervention. Preventive strategies, including workplace wellness programs, smoking cessation support, and regular cardiovascular screening, should be mandated for security personnel to mitigate these occupational health hazards.

REFERENCES

1. Hippisley-Cox J, Coupland C, Vinogradova Y, Robson J, Minhas R, Sheikh A, Brindle P. Predicting cardiovascular risk in England and Wales: prospective derivation and validation of QRISK2. *Bmj*. 2008 Jun 26;336(7659):1475-82.
2. Patnaik A, Dash A, Samal MR, Nanda S. Health profile of security personnel in a tertiary care hospital in Odisha. *National Journal of Physiology, Pharmacy and Pharmacology*. 2022 Sep 1;12(9):1408-.
3. Hippisley-Cox J, Coupland C, Vinogradova Y, Robson J, May M, Brindle P. Derivation and validation of QRISK, a new cardiovascular disease risk score for the United Kingdom: prospective open cohort study. *Bmj*. 2007 Jul 19;335(7611):136.
4. Badawy MA, Naing L, Johar S, Ong S, Rahman HA, Tengah DS, Chong CL, Tuah NA. Evaluation of cardiovascular diseases risk calculators for CVDs prevention and management: scoping review. *BMC Public Health*. 2022 Sep 14;22(1):1742.
5. Kumar AS, Sinha N. Cardiovascular disease in India: A 360 degree overview. *Medical Journal Armed Forces India*. 2020 Jan 1;76(1):1-3.
6. Aggarwal P, Sinha SK, Khanra D, Nath RK, Gujral J, Reddy KK, Mukherjee A. Comparison of original and modified Q risk 2 risk score with Framingham risk score-An Indian perspective. *Indian Heart Journal*. 2021 May 1;73(3):353-8.
7. Chandrawanshi V, Gaikwad NR, Keche Y, Wasnik P, Dhaneria S. Ten-Year Cardiovascular Risk as Predicted by the QRISK® 3 Calculator in Diabetic Patients Attending a Tertiary Care Teaching Hospital in Central India and Its Application to Stratify Statin Over-Users and Under-Users. *Cureus*. 2023 Oct;15(10).
8. Clark AM, DesMeules M, Luo W, Duncan AS, Wielgosz A. Socioeconomic status and cardiovascular disease: risks and implications for care. *Nature Reviews Cardiology*. 2009 Nov;6(11):712-22.
9. Batsis JA, Lopez-Jimenez F. Cardiovascular risk assessment-From individual risk prediction to estimation of global risk and change in risk in the population. *BMC medicine*. 2010 Dec;8:1-6.
10. Ofori SN, Odia OJ. Risk assessment in the prevention of cardiovascular disease in low-resource settings. *Indian Heart Journal*. 2016 May 1;68(3):391-8.
11. George C. A population-based study on Awareness of Cardiovascular Disease Risk Factors. *Indian Journal of Pharmacy Practice*. 2014;7(2).
12. Świątkiewicz I, Di Somma S, De Fazio L, Mazzilli V, Taub PR. Effectiveness of intensive cardiac rehabilitation in high-risk patients with cardiovascular disease in real-world practice. *Nutrients*. 2021 Oct 29;13(11):3883.
13. Murabito JM, Pencina MJ, Nam B, et al. Sibling Cardiovascular Disease as a Risk Factor for Cardiovascular Disease in Middle-aged Adults. *JAMA*. 2005;294(24):3117–3123. doi:10.1001/jama.294.24.3117
14. Gaziano T, Reddy KS, Paccaud F, Horton S, Chaturvedi V. Cardiovascular disease. *Disease Control Priorities in Developing Countries*. 2nd edition. 2006.
15. Nangia R, Singh H, Kaur K. Prevalence of cardiovascular disease (CVD) risk factors. *Medical journal armed forces India*. 2016 Oct 1;72(4):315-9.
16. Mbewu A, Mbanya JC. Cardiovascular Disease. In: *Disease and Mortality in Sub-Saharan Africa*. 2nd ed. The International Bank for Reconstruction and Development / The World Bank, Washington (DC); 2006. PMID: 21290655.
17. Yadav S, Arokiasamy P. Understanding epidemiological transition in India. *Global health action*. 2014 Dec 1;7(1):23248.
18. Nilsson PM, Nilsson JÅ, Berglund G. Family burden of cardiovascular mortality: risk implications for offspring in a national register linkage study based upon the Malmö Preventive Project. *Journal of internal medicine*. 2004 Feb;255(2):229-35.
19. Reiner Ž. Statins in the primary prevention of cardiovascular disease. *Nature Reviews Cardiology*. 2013 Aug;10(8):453-64.
20. Subih M, AlBarmawi M, Bashir DY, Jacob SM, Sayyah NS. Correlation between quality of life of cardiac patients and caregiver burden. *Plos one*. 2020 Aug 3;15(8):e0237099.
21. Peçanha T, Silva-Júnior ND, Forjaz CL. Heart rate recovery: autonomic determinants, methods of assessment and association with mortality and cardiovascular diseases. *Clinical physiology and functional imaging*. 2014 Sep;34(5):327-39.
22. Morshedi-Meibodi A, Larson MG, Levy D, O'Donnell CJ, Vasan RS. Heart rate recovery after treadmill exercise testing and risk of cardiovascular disease events (The Framingham Heart Study). *The American journal of cardiology*. 2002 Oct 15;90(8):848-52.