

THE EMERGENCE OF METABOLIC SYNDROME IN POLICE PROFESSIONALS: A LONGITUDINAL OBSERVATIONAL STUDY.

Amrit Pattojoshi^a, Bhabani Shankar Shit^b, Satish Kumar Sinha^c, Idrees S A^{d,*}, Niska Sinha^e

^a Professor, Department of Psychiatry, Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha, India

^b Associate Professor, Department of Psychiatry, PRM Medical College, Baripada, Odisha, India

^c Associate Professor, and Head, Department of Psychiatry, Jan Nayak Kapoori Thakur Medical College, Madhepura, Bihar, India

^d Assistant Professor, Department of Psychiatry, Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha, India

^e Assistant Professor, Department of Psychiatry, Indira Gandhi Institute of Medical Science, Patna, Bihar, India

Abstract.

Objective:

This is a longitudinal observation looking for the emergence of metabolic syndrome (MetS) in a rapid response police unit.

Methods:

After taking informed consent, measurements were taken of blood pressure, body mass index (BMI), waist circumference, triglycerides, HDL-cholesterol, and fasting blood glucose periodically in 2019, 2021, and 2023 in January. 146 police officers enrolled out of 148 screened and 117 completed the study.

Results:

In four years, the proportion of individuals with MetS values exceeding the norm increased by 20-30% for each component with 56 new cases of impaired metabolic parameters and 13 new cases of MetS observed among 110 previously unaffected police officers.

Conclusion:

A significant increase in the numbers of Metabolic Syndrome was found, particularly via its effects on blood lipid levels in police personnel which itself a highly stressful professional. Future longitudinal studies with continuous stress monitoring and comparing with a control will more in-depth knowledge into it.

Keywords: Metabolic syndrome (MetS), lipid profile, Police personnel, Submitted: 2023-09-05, Accepted: 2023-09-22

1. INTRODUCTION.

Modern society is plagued by stress, which has become a global public health issue [1, 2]. Continuous stress can result in unproductive ruminating, which consumes energy and reinforces the experience of stress [3]. In addition, excessive stress

can compromise resilience characteristics such as faith and the capacity to forgive [4-6]. There is evidence that excessive stress can negatively impact both physical and mental health [7-8], even though certain levels of stress may enhance performance. Stress has been linked to autoimmunity, migraines, obesity, muscle tension and backache, elevated cholesterol, coronary heart disease, hypertension, and other issues affecting the quality

*Corresponding author.

Email address: idreeskem@gmail.com (Idrees S A)

of life in humans [9-11].

Workplace psychological stress is regarded as a risk factor for metabolic syndrome (MetS). The modern world is facing a pandemic of lifestyle disorders that necessitate changes made consciously by individuals, and stress management strategies are the best lifestyle ever devised, with potential in the prevention, management, and rehabilitation of prevalent lifestyle disorders [12]. Several theoretical models have been utilized to quantify occupational stress exposure. In the occupational field, the Job Demand Control Support (DCS) model by Karasek [13] and the Effort-Reward Imbalance (ERI) model by Siegrist et al. [14] are the two most popular general models. It has been determined that police officers are at a significant risk for MetS and coronary heart disease. MetS-related parameters, such as impaired fasting glucose and impaired glucose tolerance, are more prevalent in police officers than in other employees, and alterations in biochemical parameters are correlated with self-perceived stress levels [15-18].

In a limited sample of female police officers, the Buffalo Cardio-Metabolic Occupational Police Stress study found a significant correlation between stress and MetS [19]. A recent longitudinal study confirmed that psychological distress can predict incident dyslipidemia in police officers [20].

We hypothesized that employees exposed to greater occupational stress have a higher prevalence of metabolic syndrome or its components. This study's objective was to examine the relationship between stress and metabolic syndrome in a healthy population, namely the police officers of a rapid response unit.

2. MATERIALS AND METHODS.

2.1. Study design and population.

After obtaining the informed consent of the participants, this study started in 2019 in January. In 2019, 146 out of 148 employees participated; one female worker was excluded to prevent gender bias. 117 police officers completed the study. The primary reason for leaving the cohort

was transfer to other police divisions (20 individuals), followed by retirement (6 individuals) and death (3 officers).

Components of the metabolic syndrome were defined by the International Diabetes Federation (IDF) guide and the National Cholesterol Education Programme Expert Panel on Detection Evaluation and Treatment of High Cholesterol in Adults [21, 22].

2.2. Data Collection.

Measurements were taken for blood pressure, body mass index (BMI), waist circumference, triglycerides, HDL-cholesterol, and fasting blood glucose periodically in 2019, 2021, and 2023 in January.

2.3. Statistical Analysis.

Students paired t-test was used to comparison between different parameters over time. The Statistical Package for Social Science (IBM/ SPSS) for Windows (rel. 20.0) was utilized for analyses.

3. RESULTS.

At the start of the study, the sample's mean age was 35 years. The average duration of service in the police department was 14 years. More than half of the policemen (73) were officers, while the rest held higher ranks and were compensated marginally more than officers. At baseline, there were 55 cases of obesity, 18 cases of high blood pressure, 13 cases of hypertriglyceridemia, 13 cases of low HDL cholesterol, and 4 cases of high fasting glucose. 7 out of 145 individuals had MetS at baseline.

During the three years of observation of the subjects who completed the follow-up, the prevalence of obesity, high blood pressure, hypertriglyceridemia, low HDL cholesterol, and high fasting glucose were 93, 36, 21, 18, and 5, respectively, after the observation period. In four years, the proportion of individuals with MetS values exceeding the norm increased by 20-30% for each component. There were 56 new cases (incidence) of obesity, hypertension, hypertriglyceridemia, low

HDL-cholesterol, and high fasting glucose. Compared to baseline, the mean levels of total cholesterol, triglycerides, and blood glucose had increased by 7, 5, and 5, respectively, while HDL-cholesterol had decreased by 4. All distinctions were statistically significant (paired-samples Student's t-test, $p < 0.001$). Twenty people were reported to have three or more metabolic components, indicating a MetS diagnosis. 13 new cases of MetS were observed among 110 previously unaffected police officers.

4. DISCUSSION.

Numerous prior studies have shown that life stress causes MetS and that stress may also be caused by occupational issues [23, 24]. However, distinguishing between work and life stress is problematic due to the difficulty of observing a population in which occupational stressors predominate. In our study, police officers' continuous exposure to hazards associated with law enforcement allowed them to disregard stressful life events. Numerous cross-sectional observations, utilizing the ERI model or other validated questionnaires, as well as longitudinal studies, which adopted measures of self-perceived stress [25], organizational justice [26], or job strain according to Karasek's model [13], demonstrated an association between occupational stress and MetS. Moreover, baseline distress was associated with an increased risk of MetS at follow-up [27]. These studies all support the hypothesis that protracted occupational stress can increase the risk of MetS. Because of this, we believe it is essential to perpetually monitor the metabolic parameters in a specific professional group.

Blood lipids appeared to have the strongest relationship among MetS components in this cohort. Hypertriglyceridemia was significantly more prevalent among distressed officers. Given the limited number of observations, these findings should be interpreted with caution.

All of the aforementioned police research is cross-sectional. Only one follow-up study [28] that reported an increased incidence of dyslipidemia among Chinese traffic control officers was

discovered. Additional longitudinal studies of the type we conducted could provide valuable evidence for planning interventions to reduce police officers' exposure to work-related stress, MetS, and associated health risks. Concerning potential underlying mechanisms of MetS, there is evidence that the relationship between work stress and MetS is mediated by indirect effects on health behavior and direct effects on neuroendocrine stress pathways [16]. Numerous studies, both cross-sectional and longitudinal, have linked occupational stress to unhealthy behavior and adiposity. Chronic stress heightens susceptibility to diet-related abdominal obesity and oxidative stress, which in turn may induce insulin resistance, dyslipidemia, and impaired glucose tolerance.

5. CONCLUSION.

This research lends support to the notion that the physical health of police professionals should be paid attention to with periodic monitoring of all metabolic parameters for early intervention. Every effort must be made to prevent downplaying the issue. The application of prevention to healthy individuals is necessary to avoid distress that may result in disease. The community's safety is contingent upon the health of law enforcement personnel. Because of this, we must prioritize the prevention of stress among police officers and combat the stigma associated with distress and disease. Our findings should motivate researchers to conduct additional prospective investigations. Programs designed to reduce work stress and enhance lifestyles could provide significant health and productivity benefits for police officers.

6. LIMITATIONS.

The limitations of this study include a small sample population who were included in this study. The findings of this study cannot be generalized for a larger sample population. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

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8. LIST OF ABBREVIATIONS.

BMI- body mass index
HDL- high-density lipoprotein
MetS- metabolic syndrome
DCS- Demand Control Support
ERI- Effort–Reward Imbalance
IDF- International Diabetes Federation
SPSS- Statistical Package for Social Science
ERI- elective replacement indicator

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10. Conflict of interest.

The authors report no conflicts of interest in this work.

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