

Musculoskeletal disorders, stress perception and physical activity in police officers

Desordens musculoesqueléticas, percepção de estresse e atividade física em policiais

Trastornos musculoesqueléticos, percepción del estrés y actividad física en agentes de policía

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ABSTRACT | The purpose of this study is to analyze association between stress perception and physical activity with the prevalence of symptoms of musculoskeletal disorders (SMSD) in police officers. The police officers (n=142) answered the Perceived Stress Scale-10 (PSS-10) and the Nordic Musculoskeletal Questionnaire. Pearson's linear correlation coefficient was used to measure strength and direction of relationship between PSS-10 and prevalence of SMSD and showed a positive correlation between variables in the last 7 days (r=0.34, p=0.00001) and in the last 12 months (r=0.40, p=0.00001). The mean prevalence of SMSD in the last 12 months was lower among police officers practicing physical activity (W=1888.5, p=0.04). Multiple logistic regression analysis showed that the practice of physical activities as well as efforts to reduce stress perception both decrease the odds of musculoskeletal disorders. This study indicated that stress level and physical activity practice influenced in prevalence of SMSD. Multidisciplinary interventions with actions to reduce stress level and encourage physical activity practice are needed to control SMSD prevalence.

Keywords | Police; Occupational Risks; Motor Activity; Stress Psychological; Musculoskeletal System.

RESUMO | O objetivo deste estudo foi analisar a associação entre percepção de estresse e atividade física com a prevalência de sintomas de distúrbios musculoesqueléticos (SDM) em policiais. Os policiais (n=142) responderam à escala de estresse percebido-10 (EEP-10) e ao questionário nórdico-musculoesquelético. O coeficiente de correlação linear de Pearson foi utilizado para mensurar a força e o

sentido da relação existente entre EEP-10 e a prevalência de SDM e mostrou que existe uma correlação positiva entre as variáveis nos últimos 7 dias (r=0,34, p=0,00001) e nos últimos 12 meses (r=0,40, p=0,00001). A prevalência média de SDM nos últimos 12 meses é menor entre os policiais que praticam atividade física (W=1888,5, p=0,04). A análise de regressão logística múltipla mostrou que a prática de atividades físicas e a diminuição na percepção do estresse reduzem a prevalência de SDM. Este estudo indicou que o nível de estresse e a prática de atividade física influenciaram a prevalência de SDM. Intervenções multidisciplinares com ações para reduzir o nível de estresse e encorajar a prática de atividade física são necessárias para controlar a prevalência de SDM.

Descritores | Polícia; Riscos Ocupacionais; Atividade Física; Estresse Psicológico; Sistema Musculoesquelético.

RESUMEN | El objetivo de este estudio fue analizar la asociación entre estrés percibido y actividad física con prevalencia de síntomas del trastorno musculoesquelético (STM) en los agentes de policía. Los oficiales de policía (n=142) respondieron la escala de estrés percibido-10 (EEP-10) y el Cuestionario nórdico-musculoesquelético. Coeficiente de correlación lineal de Pearson se utilizó para medir fuerza y dirección entre EEP-10 y prevalencia de STM y mostró que hubo una correlación positiva entre las variables últimos 7 días (r=0,34, p=0,00001) y últimos 12 meses (r=0,40, p=0,00001). La prevalencia promedio de STM en últimos 12 meses es menor entre los oficiales que realizan actividad física (W=1888,5, p=0,04). El análisis de regresión logística

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múltiple mostró que actividad física y disminución de percepción del estrés reducen prevalencia de STM. El presente estudio indicó que nivel de estrés y actividad física influyó en prevalencia de STM. Las intervenciones multidisciplinarias con acciones para reducir los

niveles de estrés y fomentar la actividad física son necesarias para controlar la prevalencia de STM.

Palabras clave | Policía; Riesgos Laborales; Actividad Motora; Estrés Psicológico; Sistema Musculoesquelético.

INTRODUCTION

Police officers often perform activities associated with stress-causing factors, such as ostensible surveillance work and preservation of public order¹⁻³. Excessive exposure to risks and violence, corporative efficiency charges and poor working conditions all contribute to make police officers most susceptible to stress^{4,5}. Work stress costs are high and can be reflected both in mental health (frustration, anxiety and depression) and in physical health including the prevalence of symptoms of musculoskeletal disorders (SMSD)⁶.

Stress may be associated with an increase in SMSD⁷. Studies have shown that police officers have a higher prevalence of SMSD complaints in the following areas of the body: lower back, back, neck and knee⁶⁻⁸. Prevalence of these symptoms is directly related to these professionals' work specifics, such as running, jumping, and shooting, which consequently may cause physical trauma, the main reason for orthopedic problems³.

There is evidence for effectiveness of physical activity in significantly reducing SMSD prevalence among office workers⁹. The association analysis between stress level, physical activity practice and SMSD can provide important information in developing public strategies for policework. Thus, the aim of this study was to investigate association of SMSD prevalence with stress perception and physical activity among police officers.

METHODOLOGY

This is a cross-sectional study conducted with the Brazilian Military Police. The subjects to this study were 142 male police officers. Through a brief initial questionnaire, sociodemographic variables were collected, including age, height, weight, body mass index (BMI), marital status and number of children, as well as occupational variables such as working time in the corporation, working time in current function, working hours, if they had been away from work in the last 12 months and if they performed

some type of physical exercise more than three times a week. BMI—the ratio of mass (kg) and height (m²)—was calculated from values reported by police officers. BMI values were classified as <18.5kg/m² (underweight); 18.5kg to 24.9kg/m² (normal); 25kg to 29.9kg/m² (overweight); and >30kg/m² (obese)¹⁰. Police officers developing their functions in Radio Patrol Standard with a shift of 12×24 (12 hours working, followed by 24 hours of rest) and 12×48 (12 hours working, followed by 48 hours of rest).

The inclusion criteria were police officers with more than a year of activity in the military police operational sector, that accepted answering the questionnaires and that filled out the informed consent form. Exclusion criteria consisted of police officers away from their activities and who did not attend during the day of the data collection.

To analyze perceived stress, the Perceived Stress Scale-10 (PSS-10) was used, proposed by Cohen, Kamarck and Mermelstein¹¹ and validated in Brazil by Reis, Hino and Añez¹². This instrument, based on officer self-reporting, intends to achieve global measure of stress in order to assess what situation in the individual's life is perceived as stressful. The results of stress level can range from 0 to 40, correlating a higher score with a higher perceived stress level¹¹.

To evaluate SMSD prevalence, the general content of the Nordic Musculoskeletal Questionnaire developed by Kuorinka et al.¹³ was used, adapted and validated to Portuguese by Barros and Alexandre¹⁴. The Nordic questionnaire objectively standardizes analysis to SMSD prevalence and allows data comparison from different studies.

An exploratory analysis of the variables was performed, using graphics, equations, percentages, means and standard deviations. Pearson's linear correlation coefficient was used to measure the strength and direction of the relationship between PSS-10 and the SMSD prevalence. The Shapiro-Wilks test was used to check data for normal distribution. Student's t-test was used to compare the means of two groups under the assumption that both samples were random, independent, and originated from normally distributed population, while the Mann-Whitney w-test was used to test the null hypothesis that two independent samples came from the same population with non-normal

distribution. We used a multiple logistic regression model to calculate probabilities and odds ratios for SMSD prevalence. The statistical methods used in this work are described by Peat and Barton¹⁵. Data were analyzed using R software R Core team¹⁶.

RESULTS

Most of the workers were married (65%), practiced regular physical activity (62%) with time in company of 149.85 months (± 78.35) (Table 1).

Table 1. Sample mean (\pm standard deviation) of the quantitative variables

Variables	Mean (\pm sd)
Age (years)	36.44 (± 6.31)
Number of children	1.49 (± 1.16)
Time in company (months)	149.85 (± 78.35)
Time in current job (months)	127.73 (± 81.63)
Height (meters)	1.77 (± 0.06)
Weight (kg)	86.67 (± 12.48)
BMI (kg/height ²)	27.64 (± 3.39)

Variables	Absolute (%) values
PA 3 X Week	88 (62%)
Single	38 (27%)
Married	92 (65%)
Divorced	12 (8%)

BMI: body mass index; PA: physical activity.

Regarding SMSD prevalence in the last twelve months, police officers reported feeling more pain in the lower back (47%) and dorsal region (33%), as shown in Table 2.

Table 2. Absolute values and percentages of the number of police officers with musculoskeletal symptoms in the last 12 months

SMSD	Absolute (%) values
Lower back	67 (47%)
Dorsal region	47 (33%)
Hip-Thigh	45 (32%)
Knees	45 (32%)
Ankles	40 (28%)
Neck	36 (25%)
Shoulder	36 (25%)
Fists-Hands-Fingers	35 (24%)
Forearm	16 (11%)
Elbow	12 (8%)

SMSD: musculoskeletal symptoms.

The linear correlation coefficient between stress level with SMSD in the last seven days was statistically significant ($r=0.34, p=0.00001$), and the correlation coefficient between stress level and SMSD in last 12 months was, also, statistically significant ($r=0.40, p=0.00001$). This, therefore, indicates a moderate positive linear correlation between two variables at the two situations.

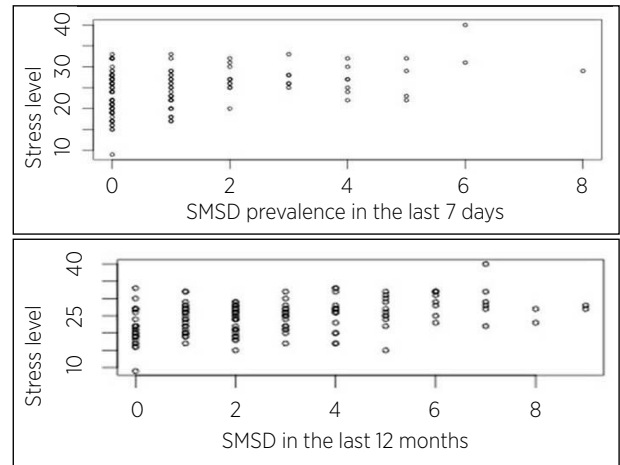


Figure 1. Scatter plot of stress level with SMSD prevalence in the last 7 days and 12 months

All police officers, who have and have not practiced physical activity more than three times/week, were included. SMSD: musculoskeletal symptoms.

Mean stress level tended to be lower among police officers who practiced physical activity more than three times/week (mean=24.01) than among police officers who did not (mean=25.33). However, there were no statistically significant differences ($t=-1.69, p=0.09$). Similarly, the mean prevalence of SMSD in last 12 months is lower among police officers who practiced physical activity more than three times/week than among police officers who did not (mean=2.40 vs 3.09, $w=1888.5, p=0.04$) as shown in Figure 2.

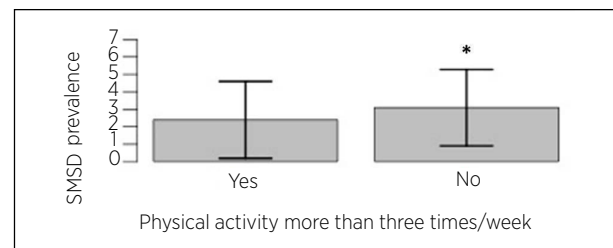


Figure 2. The sample mean of SMSD prevalence among police officers who have and have not practiced physical activity more than three times/week

Error bars represent standard deviation. SMSD: symptoms of musculoskeletal disorders.

The log odds of the prevalence of SMSD in the last 12 months were estimated by the logit model

$\ln(odds)=\ln(p/(1-p))=-2.67+0.19\times stress_leve - 0.35\times physical_activity$. It shows that practicing physical activities in the last 12 months reduces the odds of getting musculoskeletal symptoms by 30%, while a unit increase in stress perception increases the odds by 21%.

The model also shows that a police officer with a maximum stress level (PSS-10=40) who did not practice physical activities in the last 12 months presents a probability of 0.82 of developing some type of musculoskeletal disorder. On the other hand, a police officer without stress (PSS-10=0) who has practiced physical activities in the last 12 months has a very low probability (equal to 0.04) to develop some type of musculoskeletal symptom.

DISCUSSION

This study has shown that stress is directly associated with SMSD prevalence in the last seven days and SMSD prevalence in the last 12 months. Police officers are among the professionals most vulnerable to accidents and deaths in exercise of their work and most exposed to danger and aggression, often involved in everyday conflict situations generating tension, SMSD prevalence and occupational stress¹⁷⁻¹⁹.

Occupational stress is an imbalance perceived between work demands and the worker's ability to cope, with differences between each person's ideal working routine and the reality of their working conditions being the only reason to report stress perceived at work^{20,21}. Occupational stress is considered a risk factor in triggering metabolism changes, and stress can appear through minor psychological trauma that police officers might face^{22,23}.

Studies worldwide claim that the effects of occupational stress may result in anxiety, depression, alcoholism, insomnia, increased aggression, suicidal attempts or ideation, obesity, gastrointestinal diseases, hypertension, coronary heart disease, as well as other conditions^{24,25}. In this context, strategies such as the practice of physical activity are important to be considered, as they deal with stress risks and improve both quality of work and personal life, avoiding consequences to occupational stress for these professionals. It is important to highlight that stress is the cause of several health problems, such as SMSD prevalence, and that the most common and unavoidable stressors are those connected with work²⁶.

Some studies shown SMSD prevalence related to occupational stress²⁶⁻²⁸. The SMSD risk factors are known

to be generated by work activities, such as carrying of work equipment (ballistic vest, gun, ammunition, among others), repetitive tasks and incorrect posture, generating SMSD prevalence in specific body parts such as the lumbar spine, which corroborates this study's findings²⁹. Economic losses due to SMSD prevalence affect not only the individual but also the corporation and society, since SMSD can lead to inability and absenteeism³⁰, contributing to the relevancy of this study.

In this study, the police officers that practiced physical activity reported less occupational stress than participants that did not. Physical activity can decrease stress because people who practice it display lower cortisol levels, better heart rate response, more calmness and less frequent anxiety states than people who do not practice it, suggesting that physical activity may produce a protective effect against diseases related to occupational stress³¹⁻³³.

Police officers may be required to use force in search of a suspect, showing physical fitness is essential to this population³⁴. This study demonstrated police officers who exercise more than three times a week had fewer SMSD prevalence in the last seven days and in the last 12 months. One possible explanation for these findings may be due to the protective factor that physical exercise causes in the body, bringing better joint stability, flexibility and muscular endurance^{35,36}. In this sense, regular physical exercise practice is an important factor for police officers to avoid stress, SMSD prevalence and reduce absenteeism^{37,38}.

In conclusion, there was significant association between stress and SMSD prevalence. The prevalence of SMSD is lower among police officers who practice physical activity. This study indicated that stress level and physical activity influenced positive or negative in SMSD prevalence. Therefore, multidisciplinary intervention which includes actions to reduce stress level and encourage physical activity practice are needed to control SMSD prevalence in police officers.

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