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Analysis of the perception of state police officers regarding the comfort of bulletproof vests

Análise sobre a percepção de policiais militares sobre o conforto do colete balístico

Análisis sobre la percepción de oficiales de policía militar sobre la comodidad del chaleco balístico

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ABSTRACT | Officers of the State Police Force are subjected to stressful conditions during their work shift, which may compromise their quality of life, health, as well as their physical and psychological well-being. Despite these factors, little attention is given to occupational risks of this profession. This study aimed to give greater emphasis to health promotion and disease prevention for State police officers and assess the comfort of these professionals when wearing bulletproof vests and their possible associations with fatigue and pain. Research was conducted from a structured questionnaire with questions related to the comfort of the bulletproof vest, to pain and fatigue at the end of the work shift. Sample was formed by 29 male police officers. Results showed an association among general discomfort degree, occupational activities and the vest's weight (Spearman correlation equal to 0.697 and 0.7091, respectively). There were complaints related to pain in the lumbar region and fatigue at the end of the work shift. Police officers demonstrated dissatisfaction regarding the bulletproof vest comfort and complained about fatigue and pain.

Keywords | Police; Worker Health; Low Back Pain; Health Promotion; Accident Prevention.

RESUMO | O policial militar é submetido a condições fatigantes em seu turno de trabalho, que podem comprometer a qualidade de sua vida, saúde e bem-estar físico e psicológico. Apesar desses fatores, pouca atenção é dada aos riscos ocupacionais dessa profissão. Este estudo teve como objetivo dar uma maior ênfase à promoção de saúde e prevenção de doenças do policial militar e avaliar o conforto desses profissionais em relação ao colete balístico e suas possíveis associações com quadros de fadiga e de dor. A pesquisa foi realizada a partir de um questionário estruturado com questões relacionadas ao conforto em relação ao uso do colete balístico, à dor e à fadiga no fim do turno de trabalho. A amostra foi composta de 29 policiais militares do sexo masculino. Os resultados mostraram associação entre o grau de desconforto geral e nas atividades ocupacionais e o peso do colete (correlação de Spearman igual a 0,697 e 0,7091, respectivamente). Houve queixas relacionadas à dor na região lombar e fadiga no fim do turno de trabalho. Os policiais militares demonstraram insatisfação em relação ao conforto com o colete balístico e queixas de fadiga e dor.

Descritores | Polícia; Saúde do Trabalhador; Dor Lombar; Promoção da Saúde; Prevenção de Acidentes.

RESUMEN | El oficial de policía militar es sometido a condiciones agotadoras en su turno de trabajo, que pueden comprometer la calidad de su vida, salud y bienestar físico y psicológico. Además eses factores, poca atención es dada a los riesgos laborales de esa profesión. Este estudio tuvo como objectivo dar una mayor énfasis a la promoción de salud y prevención de enfermidades del oficial de policía militar y evaluar la comodidad de eses profesionales en relación al chaleco balístico y sus posibles asociaciones con cuadros de fatiga y dolor. La investigación fue realizada desde un cuestionario estructurado con cuestiones relacionadas a la comodidad en relación al uso del chaleco balístico, al dolor y a la fatiga el fín del turno

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de trabajo. La muestra fue compuesta por 29 oficiales de policía militar del sexo masculino. Los resultados mostraron asociación entre el grado de incomodidad general y en las actividades laborales y el peso del chaleco (correlación de Spearman igual a 0,697 e 0,7091, respectivamente). Hubo quejas relacionadas al dolor en la región lumbar y fatiga el fín del turno de trabajo. Los oficialies de policía militar demostraron insatisfación en relación a la comodidad con el chaleco balístico y quejas de fatiga y dolor.
Palabras clave | Policía; Salud del Trabajador; Dolor Lumbar; Promoción de la Salud; Prevención de Accidentes.

INTRODUCTION

Police officer is one of the professional categories in which exposure to physical risks is evident[1,2]. However, health-related aspects of these professionals and their needs have been having little visibility and social understanding, with a small scientific production in Brazil and other countries from Latin America[3-5].

This profession requires good physical and mental capability to take the burdens imposed by the police environment, which demands standing for many hours, extended walks and running with heavy equipment or extensive use of muscle force[6,7]. In addition, there is an epidemiological risk which, according to Minayo and Adorno[8], occurs mainly in armed confrontations with risk of life. Nature of activities carried out, work overload, internal and external relations to the corporation, which organization is based on hierarchy and discipline, are characteristics that combine risks of the profession with lifestyle, which contributes to these professional's exposal to several health risks[9].

Police officer's occupation presents a natural predisposition to low back pain, due to working hours, time spent in upright position, equipment use, physical and emotional stress[7].

Low back pain is the fifth most common reason for all medical appointments in the United States and often causes disability on people under 45 years old, as well as one of the most associated problems with absenteeism at work[10,11]. Individuals with low back pain not only suffer from physical discomfort, but also from functional limitation, which may impair quality of life. Up to a third of people with low back pain complain about moderate intensity persisting pain a year after the acute pain appearance[12,13].

Pain can be defined as an unpleasant and emotional sensory experience associated with a real or possible injury[14]. Low back pain is a debilitating disease, which causes functional limitations that can harm quality of life of the affected people and is characterized by discomfort, fatigue or muscle stiffness on the low part of the spine. Intensity may vary according to each individual. If persists for at least three months, it is considered chronic[12,15,16]. Low back pain is one of the most frequent reasons for sick leaves. It is estimated that around 60% to 80% people will have low back pain at some point of life[17,18].

Fatigue is another factor associated with pain, a subjective and complex symptom, that is difficult to measure and one of the main symptoms of patients with chronic low back pain[19]. Fatigue can be caused by occupational activities that demand intense physical effort and mental overload, associated with organizational stressors[20]. It can be defined as an unpleasant physical sensation, with cognitive and emotional components, and a tiredness that does not relieve with usual strategies of energy restoration. Such symptom varies in duration and intensity, and when it is minimized, police officers can go back to their regular activities[21].

In addition to these factors, police officers undergo a job deterioration process, due to use of unsuitable equipment and instruments, restraint of resources to maintain such equipment, exhaustive working hours followed by overtime work, disproportional salary and insufficient training conditions[22,23]. Bulletproof vest is one of the devices used, which is a personal protective equipment (PPE) regulated by the Brazil's Ministry of Labor and Employment through ordinance 191 from December 4th, 2006, and is the focus of this research.

Knowing conditions, situations of exposure to diseases and specific effects that low back pain causes in the health and life of these workers is essential, so that intervention actions and health protection measures can be adequately planned and executed[24]. In this context, the guiding question of this research was: Does operational activity cause discomfort to police officers when they are wearing bulletproof vests? If so, may this discomfort be associated with pain and fatigue at the end of the work shift?

This article aimed to examine perception of State police officers regarding the comfort of the bulletproof vest, to investigate whether vests are adjusted to body measurements and pain at the lumbar region during work time, pain and fatigue at the end of the working hours and possible relations of pain and discomfort to the practice of other physical activities.

METHODOLOGY

This investigation was conducted with police officers of the ROTAM – *Ronda Ostensiva Tática com Apoio de Motocicletas* (Tactic Ostensive Patrol with Support of Motorcycles) from the city of João Pessoa, Paraíba. The non-probabilistic type sample consisted of 29 male police officers.

This is a quantitative and exploratory study carried out through a structured questionnaire. Decision to elaborate a questionnaire is justified due to the lack of a preexisting, translated, transculturally adapted and validated for Brazilian Portuguese research protocol. Questions were related to comfort level of workers while wearing the bulletproof vest and after wearing it, and also related to pain and fatigue at the end of the work shift.

Interviewed police officers had a 12-hour activity scale and 36 hours off. Their participation occurred according to their interest and consent, following all current ethical recommendations in Brazil, according to the 466 Resolution from 2012 of the National Health Council.

After data collection, results obtained through the questionnaire application were grouped and tabulated for analysis and statistical treatment. To do it so, descriptive statistics and the Spearman's correlation coefficient were used.

Table 1. Questionnaire applied during research with police officers

Questionnaire items	Options of answers
Degree of comfort/discomfort with the vest	Extremely comfortable/Very comfortable/Comfortable/Little comfortable/Uncomfortable/Extremely uncomfortable
Degree of comfort/discomfort regarding weight of the vest	Extremely comfortable/Very comfortable/Comfortable/Little comfortable/Uncomfortable/Extremely uncomfortable
Degree of comfort/discomfort wearing the vest during operational activity	Extremely comfortable/Very comfortable/Comfortable/Little comfortable/Uncomfortable/Extremely uncomfortable
Degree of comfort/discomfort with the vest regarding body measures	Extremely comfortable/Very comfortable/Comfortable/Little comfortable/Uncomfortable/Extremely uncomfortable
Vest adjustment to the body	Extremely adjustable/Very adjustable/Adjustable/Little adjustable/Almost any adjustment/Non-adjustable
Pain at the lumbar region	Without pain/ Little pain/Moderate pain/A lot of pain/Severe pain/Unbearable pain
Do you feel exhausted at the end of the shift for wearing the vest?	No fatigue/Mild fatigue/Moderate fatigue/Intense fatigue/Unbearable fatigue

RESULTS

The questionnaire aimed to evaluate perception of police officers regarding bulletproof vest, beyond pain and fatigue levels at the end of the work shift. Table 2 include these results.

The Spearman's correlation coefficient showed that the highest correlations occurred between general discomfort degree with the vest and discomfort with the weight of the vest (0.697). Association between the weight of the vest and discomfort degree with the vest during operational activity was observed (0.709).

In the item related to bulletproof vest adjustment to police officers' bodies, 44.8% considered it little adjustable; 44.8%, adjustable; 6.9% thought that there was almost no adjustment; and 3.4% considered it extremely adjustable.

We also observed pain and fatigue levels at the end of the work shift. Regarding pain at the lumbar region, 53.3% complained about moderate pain; 20% about a

lot of pain; 16.7% about little pain; 6.7% about severe pain; and 3.3%, about unbearable pain.

Regarding fatigue level at the end of the work shift, 56.7% mentioned moderate fatigue; 33.3%, intense fatigue; 3.3%, unbearable fatigue; 3.3%, mild fatigue; and 3.3%, no fatigue.

The significance test of the Spearman's correlation coefficient was applied to test the hypothesis of independence between levels of pain and fatigue during the work shift. We found that answers to the items pertaining to these two variables are not independent (p=0.003) and presented a correlation coefficient equal to 0.535.

Table 2. Answers of the questionnaire's items about the comfort of the bulletproof vest

Degree of comfort/ discomfort with the bulletproof vest	Extremely uncomfortable	Uncomfortable	Little comfortable	Comfortable	Very comfortable	Extremely comfortable
General	26.7%	50%	20%	3.3%	-	-
Weight of the vest	23.3%	50%	23.3%	-	3.3%	-
Operational activity	33.3%	50%	16.7%	-	-	-
Body measurements	10%	33.3%	43.3%	10%	-	3.3%

DISCUSSION

Working standing or in uncomfortable positions is found in many occupations[25]. Observational studies of Engels et al.[26], Yip et al.[27] and Punnett et al.[28] reported that working in certain difficult positions can result in low back pain.

In this study, we observed the relation between general discomfort of the vest with discomfort caused by its weight, in addition to the relation between pain at the lumbar region and discomfort regarding the bulletproof vest.

Most activities carried out by police officers expose them to dangerous situations, especially nowadays, when there is an increased crime rate, which requires more effective policing actions on the streets and, consequently, results in work overload. In addition, police officers operate in unhealthy conditions, which get worse with job deterioration and disorganization[29,30].

Concerning difficulties with the bulletproof vest adjustment to the body, previous studies such as the one by Rocha[31], reported that the vest cannot always be adjusted to the body, because the State Police Force does not distribute the equipment according to the workers' body measures. Therefore, if the vest is too loose, it could be uncomfortable. If it is too tight on the chest, it could compromise the air flow to the pulmonary region, consequently decreasing oxygen level and failing to supply the brain and muscle cells, which can cause damage and difficulty for police officers to fulfill essential elements of their job, such as agility and speed.

According to Iida[32], due to the fact that police officers have to constantly wear the vest, this safety equipment must be perfectly suitable for them. If clothing is not comfortable, it could affect well-being and health of users.

According to the National Institute of Justice (NIJ)[33] standards, the vest must follow gender specifications: male or female type; model; XSmall, Small, Medium, Large and/or XLarge sizes. Ballistic panel and external covering must have a legible and indelible tag with information in Brazilian Portuguese, in contrasting color with name, logo or other identification of the manufacturer; protection level and certificate of compliance with the NIJ Standard 0101.04; serial number; manufacture date; ballistic protection expiration date; supported ammunition (caliber, speed, weight and projectile characteristics); use instructions and maintenance of ballistic panels[34].

Long police workloads evidence importance of the adjustment process of working tools to its users. Constant and inappropriate use of vests generates discomfort, impairs movement and increases locomotion time, which compromises safety and efficiency and affects health, well-being and quality of life of police workers[35].

Police officers have more incidence of low back pain which intensity is related to the work physical demand[36]. Corroborating the results of this research, Minayo et al.[37] reported that pains in the spine are part of the main health issues that affect police officers. In addition, low back pain affects the body functioning and causes functional limitation that can lead to implications on quality of life[12]. In research conducted by Achim[36] with 50 police officers in Romania, it was found that 87% of those interviewed reported back pain being -13% with moderate disability; 75% with occasional pain; and 15%, with pain on a daily basis. In addition, 45% of interviewed police officers requested sick leave due

to back pain. More than half of police officers claimed that lower back pain was high enough to obtain a a sick leave, but chose to continue working despite pain. Only a quarter of workers sought professional help to minimize pain and spine problems, looking for a doctor or a rehabilitation professional.

In a study carried out in England, the results demonstrated that in police officers who work driving, low back pain is more evident than in officers who work in the sitting position but do not drive, or than on those who work standing[38]. Low back pain affects approximately 10% of the world's population, from mild to very severe intensities, and is one of the main causes of work sick leave, which represents nearly 60% to 80% of diseases that affect workers[39,40].

Fatigue can lead to many consequences in the workplace, such as low work performance, high rates of absenteeism, high risk of involvement in work-related accidents or mistakes during work execution, injuries, and others[41].

There was association between fatigue and pain levels in police officers, that is, those who had higher levels of fatigue also showed higher levels of pain. In a research conducted by Salvetti et al.[42], the authors found association between fatigue and chronic low back pain. Participants of this research also presented higher levels of pain intensity, higher scores of depression and disability as well as lower self-efficacy scores, and showed increased risk of fatigue occurrence.

When pain is evaluated during a three-year period, there is incidence of developing low back pain of any degree or time duration. In an epidemiological study, Rubin[43], concluded that, among 148 randomly selected veterans, 67% presented pain episodes, while 44% reported moderately severe pain episodes.

Comfort of police officers needs more attention, due to importance of their job for people, the dangers they face and factors that may go unnoticed, such as the use of bulletproof vest, which is a personal protection equipment necessary for these professionals to have more safety and so they can improve their labor activity performance.

FINAL CONSIDERATIONS

Our study showed that police officers demonstrated dissatisfaction regarding the comfort of the bulletproof vest, as well as regarding fatigue and pain complaints. Due to the site of the research and to the size of the sample, it is not possible, from interviews, to indicate that bulletproof vests cause discomfort, fatigue and pain to all the state police officers.

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