

## **CHARACTERISTICS OF THE ANTHROPOMETRIC PARAMETERS FOR THE MILITARY PERSONNEL WITH MUSCULOSKELETAL PATHOLOGY**

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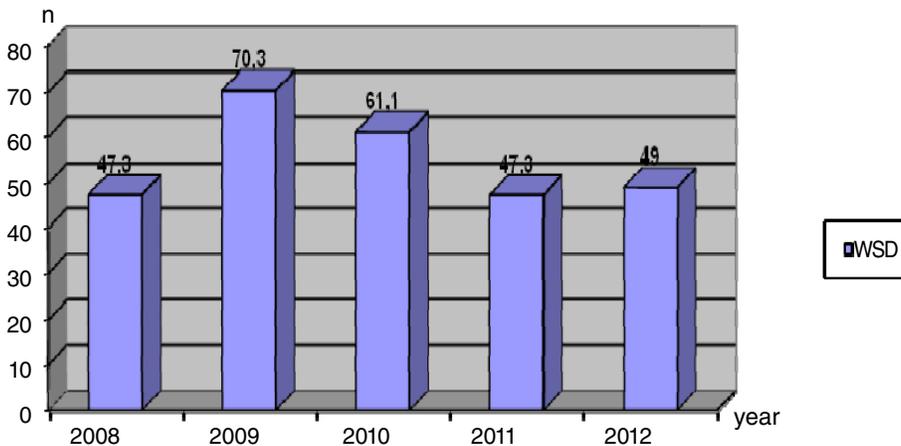
### **ABSTRACT**

Musculoskeletal disorders are an important cause of morbidity in the military service. They represent a prevalent source of patient visits, lost work time, hospitalization and disability in the military personnel. The three most important areas that had pain were lumbar spine, shoulders, lower extremities. Most often musculoskeletal pain did not affect the daily activities. Nevertheless, it may be important to provide preventive measures to reduce the risk of musculoskeletal disorders linked to a specific job and treatment at early stage. Chronically musculoskeletal disorders result in the disabilities needing long-term rehabilitation and functional impairment leading to premature discharge from the military service because of musculoskeletal problems. The nature of these problems suggests that it is a combination of ergonomic and individual/organizational matters. Intrinsic and extrinsic factors associated with the military environment and psychosocial factors may play a role in the development, exacerbation and maintenance of work disability in the military population. We have provided the evaluation of anthropometric characteristics for the military personnel going for retirement with a diagnosis of musculoskeletal pathology. Anthropometric characteristics of the military personnel (n=50) that goes to the reserve were collected during the period of two years (2011/2012). We have evaluated anthropometric characteristics: the height, the body mass anthropometric indices. Body fat ranges for standard adults were calculated according to NIH/WHO BMI Guidelines. The body mass index for the military personnel (61.3% of soldiers and 73.7% of officers) with musculoskeletal pathology surpasses the standard over 30%. It could be the one of intrinsic risk factors – the provocateur for developing spine pathology.

**Keywords:** *anthropometric characteristics of the military personnel, musculoskeletal disorders of the military personnel*

## INTRODUCTION

Musculoskeletal disorders represent the first biggest reason for premature leave from the military service. For example, in the last decade musculoskeletal disorders were the dominating pathology for the military personnel in the National Armed Forces of Latvia (Figure 1). The literature overview indicates that lumbosacral strain, intervertebral disc syndrome represent the most prevalent diagnoses for back disability in military personnel. They represent a prevalent source of patient visits, lost work time, hospitalization and disability (1). Musculoskeletal injuries and disorders have also importance from the public health point of view. They result in the disabilities requiring an expensive treatment, the long-term rehabilitation and functional impairment leading to the premature leave from the military. Musculoskeletal disorders are important for morbidity in physically active conscripts in the Finnish Defence Forces (8, 9, 10). In Norwegian, Swedish and Danish armies some larger scale epidemiological studies have shown that a significant number of training days is lost due to musculoskeletal disorders (2, 4, 5, 6). Research on the military populations in the US Army represents a prevalent source of outpatient visits, lost work time, hospitalization and disability (3).



**Figure 1.** Diagnosis of musculoskeletal disorders for the military personnel left LNAF.

There is not any scientific evidence of musculoskeletal pathology in the specific environment – the military environment. The diagnostics, assessment, evaluation and monitoring of musculoskeletal disorders could be provided by the use of traditional diagnostic methods that includes the determination of intrinsic and extrinsic factors. Intrinsic risk factors, linked to the military training

injuries, include a diverse range of inherent variables such as the level of prior health and physical condition, psychological makeup, age, height, weight, and gender. Extrinsic risk factors for the military musculoskeletal disorders include the training surface, the exercise when fatigued, progressive training in a place of cyclical training and the type of usually worn footwear. Other military specific variables may also include the drill methods, the arrangement of platoons, the training technique, and the actual training distance (7). It may be of importance to consider broadening the medical disciplines onsite to provide preventive measures and treatment an early stage and thereby reducing the risk of chronicity.

Individual anthropometric characteristics can be used for the assessment of one the intrinsic risk factors – overweight.

## **MATERIAL AND METHODS**

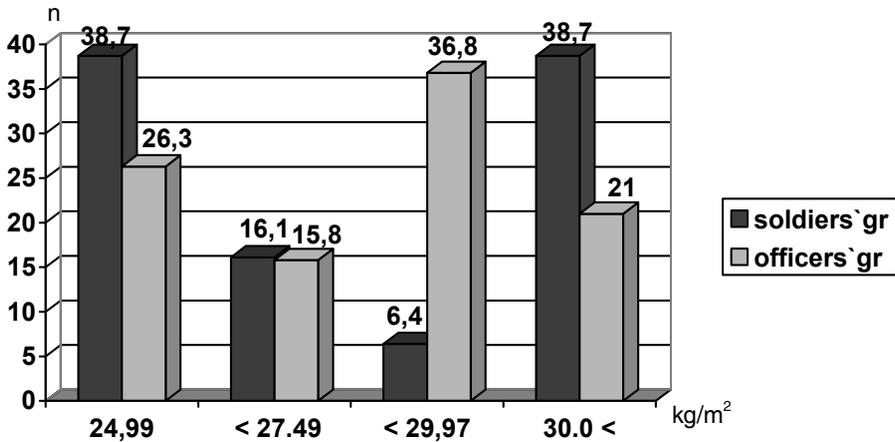
We have provided the evaluation of anthropometric characteristics for the military personnel going for retirement with the diagnosis of musculoskeletal pathology. Anthropometric characteristics of the military personnel (n=50) that goes to reserve were collected during the period of two years (2011/2012). There were military officers n=19 and soldiers n=31 during the two years period. They represented various units: the Air Forces, the Naval Forces, the Land Forces and military specialists. The health capacity of respondents was evaluated in hospital. All the participants had musculoskeletal (spine) pathology with or without functional disturbances and with or without disc protrusion.

We have evaluated anthropometric characteristics: the height, the body mass anthropometric indices. Body fat ranges for standard adults were calculated according to NIH/WHO BMI Guidelines.

## **RESULTS AND DISCUSSION**

The analysis of the anthropometric characteristics – the body mass index in the respondent group revealed that there was a small difference between the average data in the officers' group ( $27.6 \pm 0.9 \text{ kg/m}^2$ ) and the soldiers' group ( $28.5 \pm 1.3 \text{ kg/m}^2$ ). The analysis of the BMI value in the soldiers' group shows that only 38.7 % of respondents had the BMI in the standards' deviation limits (up to  $24.99 \text{ kg/m}^2$ ). The 38.7% of respondents of the soldiers' group had the BMI for 30% over the standard limits. The analysis of the BMI value in the officers' group revealed that 26.3% of respondents had the BMI value in the standards' deviation limit, but the upgrading value of the BMI was not so high than in the

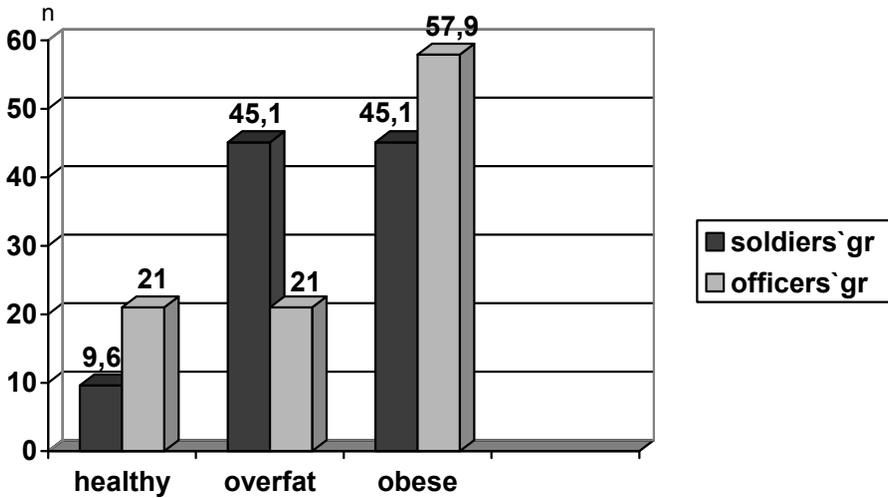
soldiers' group. 21.0% of respondents in the officers' group had the BMI value for 30% over the standards limits. (Figure 2)



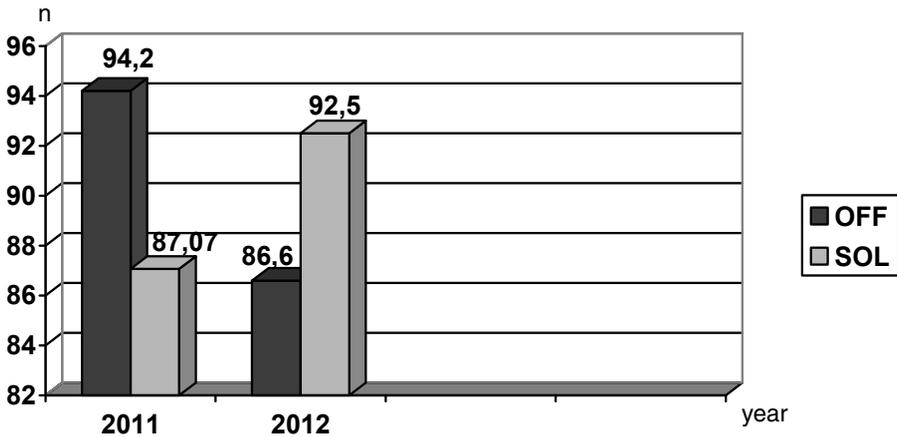
**Figure 2.** Distribution of the value of the BMI in the soldiers' and the officers' group (%).

We provided the calculation of the body fat ranges for adults and revealed that only 9.6% of soldiers were included in the healthy group, but 45.1% of respondents from the soldiers' group were in the obese group. The situation with the body fat ranges in the officers' group showed that 21.0% of respondents were in the healthy group, but 57.9% belonged to the obese group ( Figure 3). The average value of body fat ranges in the soldiers' group was  $27.52 \pm 1.17 \text{ kg/n}^2$  and in the officers' group  $-28.54 \pm 1.65 \text{ kg/m}^2$ .

The body mass characteristic is the most variable anthropometric parameter. We have determined it in the soldiers' and the officers' groups. The average body mass value in 2011 for soldiers was  $87.06 \pm 6.39 \text{ kg}$  but in 2012 it was  $92.5 \pm 4.32 \text{ kg}$  with variations from the minimal 54 kg up to the maximal 140 kg. The average body mass value for officers was  $94.2 \pm 6.55 \text{ kg}$  in 2011 but in 2012 it was  $86.6 \pm 6.20 \text{ kg}$  with a wide range of changes from 58 kg up to 127 kg (Figure 4).



**Figure 3.** Distribution of the value of the body fat ranges in the soldiers' and the officers' group (%).



**Figure 4.** The distribution of the body mass value in soldier's and officer's groups.

The height parameters for the soldiers were higher than for the officers (Figure 5). We revealed that the average value of height parameters in the soldiers' group were  $175,6 \pm 2,15$  cm (2011) with the variation from 158 up to 187 cm and  $176,6 \pm 1,77$  cm with changes from 165 up to 190 cm. In 2011 the average value of height parameters in the officers' group was  $181,5 \pm 2,03$  cm but in 2012 it was  $177,7 \pm 2,11$  cm with the fluctuation from 168 cm up to 190 cm.

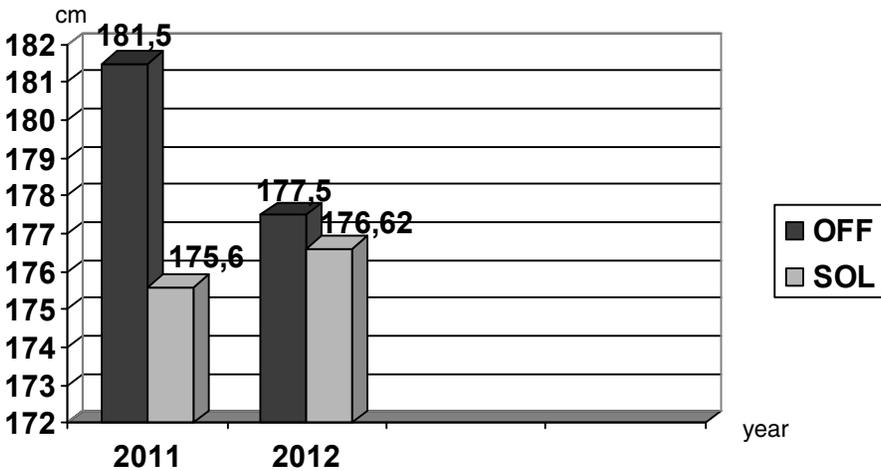


Figure 5. Distribution of the value of height in the soldiers' and the officers' group.

## CONCLUSION

1. The body mass index for the military personnel (61.3% of soldiers and 73.7% of officers) with musculoskeletal pathology surpasses the standard over 30%. It could be the one intrinsic risk factor – the provocateur for developing spine pathology. For 38.7% of soldiers and 21% of officers' The Body Mass Index was over the upper limits of the BMI.
2. Body fat ranges for the military personnel in the soldiers' and the officers' investigation groups show that the number of persons with the healthy scale grade is low: 9.6% respondents from the soldiers' group and 21.0% from the officers' group. The obese scale grade was 45.1% in the soldiers' group and 57.9% in the respondents from the officers' group.
3. The body mass parameters have individual differences, their variation boundaries were from 54 kg up to 140 kg in the soldiers' group and 58 kg up to 127 kg in the officers' group. The average body mass in the soldiers' group was  $89.7 \pm 3.7$  and  $90.4 \pm 4.28$  in the officers' group.
4. The individual variations of height parameters changed in the interval from 168 cm up to 190 cm in the soldiers' group and from 158 cm up to 190 in the officers' group. The average height parameters in the soldiers' group was  $176.1 \pm 1.39$  cm and in the officers' group  $184.6 \pm 1.29$  cm.

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