OCCUPATIONAL DISEASES ARISING IN THE AREA OF THE MINISTRY OF DEFENCE IN THE CZECH REPUBLIC AND THEIR RELATIONSHIP TO WORK CATEGORIZATION

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SUMMARY

Objective: The article deals with occupational health protection and identification of health risks in the work environment of the Ministry of Defence (MoD) of the Czech Republic (CR). It focuses on the assessment of the incidence of occupational diseases (OD) in high-risk and risk-free occupational categories in the years 2010–2019 and compares them with data from the civilian sector. It identifies the differences between military staff and civilian employees of the MoD.

Methods: From the records of OD at the Department of Occupational Diseases of the Central Military Hospital in Prague, the data on acknowledged OD from the years 2010 to 2019 were obtained and then a retrospective analysis focusing on the classification of work at risk was performed. The obtained data were compared with the data from the Czech National Registry of Occupational Diseases (NROD), which are published annually by the National Institute of Public Health.

Results: In the years under review, 191 OD were confirmed at the area of MoD, 26% of all OD occurred in employees classified in the occupational risk category. Compared with the data in the NROD, where 50% of OD were found to have been caused by high-risk work, the incidence of OD caused by high-risk work in professional soldiers is lower. Only 1.6% of all OD occurred in professional soldiers whose work was classified as high-risk one. In civilian employees of MoD 24.6% of all OD were connected with high-risk work. On the contrary, the proportion of OD occurring in professional soldiers working in risk-free categories was 57.6%, in civilian employees of MoD was the ratio much lower – 16.2%.

Conclusion: Work at the Ministry of Defence was not adequately categorized, therefore, in 2020 a new categorization of work was introduced, which together with preventive measures could contribute to reducing the incidence of OD at the Ministry of Defence.

Key words: work categorization, occupational disease, risk factor, Ministry of Defence, occupational health services

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INTRODUCTION

Hygiene security at the Ministry of Defence (MoD) includes the health care of employees, both professional soldiers and civilian employees. Each unit commander is obliged to create conditions to ensure protection of the work environment and measures to prevent the incidence of occupational diseases. A number of legal regulations such as Act No. 262/2006 Coll., Labour Code; Act No. 258/2000 Coll., on public health protection; Act No. 221/1999 Coll., on professional soldiers; and Act No. 373/2011 Coll., on specific health services deal with occupational safety, health protection and working conditions. Other regulations include Minister of Defence Orders (MoDO): MoDO No. 41/2018 – Occupational Health and Safety at the Ministry of Defence, MoDO No. 48/2019 – Occupational Health Services at the Ministry of Defence.

The Public Health Protection Authority (PHPA) is the Chief Hygienist of the MoD (ChH MoD), who exercises state health supervision over the health protection at the MoD. Preventive health surveillance is provided by the Military Health Institute (MHI) of the Military Health Agency. The staff of the MHI prepares documents for the ChH MoD, takes samples of chemical substances, measures physical factors in the work environment, examines drinking water, operates a microbiological laboratory and the serum bank of the Army of the Czech Republic (ACR). Doctors from health service centres and battalion dressing sta-

tions participate in providing routine hygiene surveillance, which involves supervision on troop training, accommodation, water supply, catering, waste disposal, and prevention of OD. They also provide anti-epidemic care, including vaccination against communicable diseases.

The employer is also obliged to equip employees with personal protective equipment (PPE), provide workplace equipment for pre-medical first aid (first aid kits) and organize training on occupational safety and fire protection. He/she is also obliged to send workers for occupational medical examinations (OME) and to assess their fitness for work and service (1, 2). These occupational health services do not apply to a free choice of the general practitioner. At the Ministry of Defence, these examinations are provided by the health service centres catchment areas, the Health Security Department of the DUKLA Army Sports Centre and the Military Medical Intelligence Centre. The Institute of Aviation Medicine in Prague provides OME for military aviation personnel. The Department of Occupational Diseases of the Military University Hospital Prague, the Military Hospital Brno and the Military Hospital Olomouc provide specialized partial examinations for assessing medical fitness to work in hazardous work environment (dust, noise, vibrations, chemical substances, biological agents, etc.), for assessing special medical fitness (pyrotechnists, fire fighters) and for assessing soldiers with limited medical fitness. Furthermore, the above mentioned facilities assess medical fitness of professional soldiers before their departure for a foreign military operation (work abroad in areas with extreme hard weather conditions and epidemiological patterns) and after their return.

Work Categorization

To ensure the protection of employees' health, the employer is obliged to evaluate the health risks in the occupational environment and to carry out so-called work categorization according to the level of individual risk factors of working conditions. In the ACR, the unit commander is responsible for all the above-mentioned duties and the performance of soldiers' military duties corresponds to the work activity. Basic criteria for the work categorization are provided by the unit commander. The risk factors of the occupational environment include dust, chemical substances, noise, vibrations, electromagnetic field, non-ionizing and ionizing radiation, physical load, psychic load, working position, exposure to heat and cold, work with biological agents and in high-pressure areas, and visual load (3).

In the Czech Republic, there are four occupational categories distinguished from each other by the level of risk factors (3). When classifying a job into a work category, the most harmful factor must be considered. The first category includes jobs where the exposure to the risk factors is minimal, and the influence of these factors from a health point of view is not significant. The second category comprises jobs where the level of exposure to the risk factors is tolerable, hygienic limits of these factors are not exceeded, but adverse health effects on susceptible individuals, e.g., allergic persons, cannot be excluded. The third category includes work at which the occupational exposure limits are exceeded and therefore the implementation of alternative technical and organizational measures and the use of PPE are necessary to reduce the negative impact on the workers' health. The fourth category includes work where the exposure limit values are greatly exceeded. Therefore, there is a high risk of health hazards that cannot be eliminated even if precautions are taken; work-related health damage is more likely to occur. Risk-free occupation falls into categories 1 and 2 (4, 5). An overview of hazardous work at the MoD is registered by ChH MoD through the Department of Hygiene of the Ministry of Defence.

The Czech Republic has a long-established system of work categorisation, which is unparalleled in other European countries except Slovakia. Therefore, it is mentioned classification according to the European recommendations. Three occupational risk categories have been defined concerning the need to use PPE according to the type of risk (6).

Occupational Diseases

Occupational diseases are diseases that result from the adverse effects of biological, physical, chemical, or other harmful influences in the work environment. Occupational diseases are recognized by the relevant occupational medicine providers (mainly clinics and occupational disease departments of university and regional hospitals) in the civilian sector. At the Ministry of Defence, this provider is the Occupational Disease Department of the Central Military Hospital – Military University Hospital Prague. The following conditions should be fulfilled for the recognition of OD. The disease must be indicated in the current list of occupational diseases, the last amendment of which was made in 2015 by Government Decree No. 168/2014 Coll. The diagnosis of OD is based on the results of a medical examination together with a determination of the degree of disability severity. It must also be verified that the person has worked under hazardous conditions and the work performed is classified as hazardous. This verification of hygienic conditions for the occurrence of an OD is carried out by the locally competent regional hygiene station (RHS) in the civil sector, or by the MHI at the MoD. Measurements are carried out by authorized or accredited laboratories.

Government Decree No 290/1995 Coll., Annex 1, as amended, determines the List of occupational diseases. It consists of six chapters, each containing several items indicating conditions for the occurrence of OD (7).

MATERIALS AND METHODS

The aim of this study was to analyse occupational diseases in relation to risk-free and high-risk work categories at the Ministry of Defence in the period 2010–2019. The objective was to compare the obtained data with the data from the Czech National Registry of Occupational Diseases (NROD), which are published annually by the National Institute of Public Health, and to show specific risks of service and work performance at the MoD. In addition, the consensus in the job categorization created by the employer was evaluated in comparison with the values obtained when verifying conditions for the incidence of OD through the Military Health Institute.

To achieve the objectives of the study, a retrospective analysis of data on recognized OD at the MoD was carried out. These data, including the classification of work into the risk categories, were obtained from the records of the Occupational Diseases Department of the Central Military Hospital in Prague. The incidence

of OD in risk-free and high-risk categories as well as the representation of professional soldiers and civilian employees were compared. These data were compared with the data from the Czech NROD (8, 9). The data on high-risk work were obtained from the records of the MHI.

The statistical significance of differences in frequencies of OD in the subgroups was tested using the Pearson's chi-squared test.

RESULTS

In 2019, work of 2,806 professional soldiers and 1,904 civilian employees at the MoD was classified as high-risk. In 2019, OD were reported in 9 (0.19%) of them, whereas in 22 (0.045%) of employees at risk-free work. In the years under review, 191 occupational diseases were recognized at the MoD, 50 of them (26%) occurred in employees classified in the high-risk category. In the 191 OD cases, the proportion of OD occurring in professional soldiers in high-risk categories is only 1.6% (3 cases), in civilian employees of MoD the proportion is higher – 24.6% (47 cases). On the contrary, the proportion of OD occurring in professional soldiers working in risk-free categories is 57.6% (110 cases), in civilian employees of MoD the proportion is much lower – 16.2% (31 cases). Statistical evaluation revealed significant differences in the proportion of OD between OD occurring in soldiers during risk-free work and civilian employees performing high-risk work (Table 1).

The incidence of occupational diseases at high-risk and risk-free work in each year is compared in Figure 1. The proportion of OD arising from high-risk work ranges from 5% to 65% and is influenced by the occurrence of two scabies epidemics – 25 cases (13%) in a health facility in 2017 and 2019. In these years, the number of OD arising in the high-risk work category was high, as healthcare professionals were adequately assigned to the risk category due to their contact with biological agents. On the contrary, an increased incidence of OD in risk-free categories was found in relation to infectious diseases emerging in professional soldiers in foreign operations: malaria – 25 cases (13%), acute diarrhoeal diseases – 44 (23%), other infections contracted abroad – 10 (5.2%). Tick-borne diseases, i.e., Lyme disease – 27 (14.1%) and tick-borne encephalitis – 4 (2.1%) occurred only in risk-free categories for both professional soldiers and civilian employees when the principal risk factor was outdoor work (forester, technician or soldier in field training). In the period under review, 10 (5.2%) infectious diseases occurring in the Czech Republic (tuberculosis, viral hepatitis C, mumps, measles, viral hepatitis B, influenza – 2 cases, Chlamydia – 2 cases, erysipelas) were recognised as OD, mostly in healthcare personnel; the work of 4 healthcare workers was classified as a high-risk category due to their work with biological agents. Skin

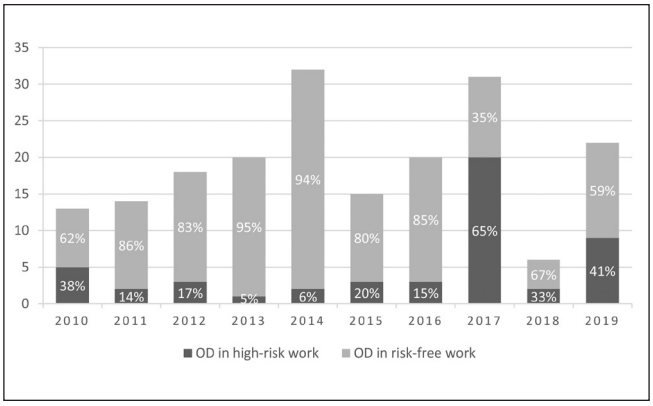

Fig. 1. *Frequency and proportion of occupational diseases in military sector in high-risk and risk-free category in 2010–2019.*

diseases (allergic/contact dermatitis) occurred in 2 healthcare workers at risk-free work.

The most common risk causing OD from the group of physical factors was hand-arm vibration, which is causally related to the development of peripheral neuropathies and joint disorders in upper extremities. These OD occurred only in civilian employees, mostly (80%) in jobs adequately classified in the high-risk category; these were employees of the Czech Military Forests and Estates and the Military Vehicle Repair Company. Only 20% of the jobs diagnosed with OD associated with hand-arm vibration were not classified as high-risk jobs. The situation is different when assessing OD arising from repetitive strain injury (RSI) where 100% of OD were found in the risk-free category (according to the employer's categorization) and only during an investigation performed by the MHI the excessive overload caused by this factor was detected. While working at the risk of RSI according to MHI, the following problems occurred – carpal tunnel syndrome, wrist arthritis, chronic wrist tendonitis, and epicondylitis of the humerus.

When assessing OD in relation to noise, one OD (perceptive hearing loss) in the high-risk category was found in a forester (civilian employee), two OD (effects of noise on inner ear) were diagnosed in tank drivers and in armoured infantry fighting vehicle drivers (professional soldiers) whose work was not categorized as a job with hazardous noise. In the measurement of the MHI, the noise burden during the performance of duty was found to be above the limit. Concerning OD caused by chemical agents, only two cases were found – carbon monoxide intoxication in professional soldiers when firing from a tank during the training. The work was not categorized as a risk, but during the measurement of the MHI, in this case the maximum permissible concentration of CO was exceeded (Table 2).

Data from the Czech NROD from the years 2010–2019 shown that on average 50% of OD in the CR occurred in the risk category

Table 1. *Occupational diseases in high-risk and risk-free work in soldiers and civilian employees in MoD (N = 191)*

	All employees	Soldiers	Civilian employees	Chi-square test
OD in high-risk work	50 (26%)	3 (2.7%)	47 (60.3%)	p < 0.001
OD in risk-free work	141 (74%)	110 (97.3%)	31 (39.7%)	
All OD	191 (100%)	113 (100%)	78 (100%)	

Table 2. *Occupational diseases according to aetiology and type*

Aetiology	Specification	Type of disease/diagnosis	Total number of OD	Number of OD in high-risk work
Chemical substances	Carbon monoxide	Carbon monoxide poisoning	2	0
Physical factors	Ionizing radiation	Chronic lymphocytic leukaemia	1	1
	Noise	Chronic perceptual hearing loss	3	1
	Hand-arm vibration	Carpal tunnel syndrome	19	18
		Arthrosis	2	2
	Repetitive strain injury	Epicondylitis, arthrosis, tendinitis	9	0
		Carpal tunnel syndrome	4	0
Skin disease	Chemical substances	Contact dermatitis	2	0
Biological agents	Communicable and parasitic disease	Scabies	25	22
		Other infections arising in CR	10	4
	Zoonoses	Lyme disease	27	0
		Tick-borne encephalitis	4	0
		Other zoonoses	4	2
	Infections contracted abroad	Malaria	25	0
		Acute diarrhoeal diseases	44	0
		Other infections arising abroad	10	0
Total			191	50

Table 3. *Number of occupational diseases in the Ministry of Defence and in the Czech Republic according to categorization*

	Ministry of Defence (2010–2019)	Czech Republic (2019)	Chi-square test
OD in high-risk work	50 (26%)	477 (45%)	$p < 0.001$
OD in risk-free work	141 (74%)	480 (45%)	
OD – no categorization	0	110 (10%)	
All OD	191	1,067	

Table 4. *Number of occupational diseases by employer's categorization and Military Health Institute's categorization*

	Ministry of Defence (2010–2019)	
	Employer	Military Health Institute
OD in high-risk work	50 (26%)	72 (38%)
OD in risk-free work	141 (74%)	119 (62%)
OD – no categorization	0	0
All OD	191	191

(according to the employer's categorization), in 2019 45% of OD in the CR occurred in the high-risk category (Table 3). According to the occupational hygiene assessments prepared by the RHS, 64% of OD occurred in 2019 at work that was investigated and subsequently categorized as high-risk, in contrast to 38% of OD in this category occurring at work at the MoD (Table 4).

DISCUSSION

Comparing the data from the Czech NROD from 2010–2019, when 50% of OD in the Czech Republic occurred in the risk category and only 26% of OD were diagnosed as risky work at the Ministry of Defence, it can be concluded that the work in this sector was not optimally categorized. This difference is due to the high number of OD linked with the deployment abroad (infectious diseases), that account for over 40% of all OD identified at the MoD (10). According to the data from the National Health Information Centre of Slovakia, more than 63% of occupational diseases reported in 2016–2019 occurred at work in the risk-free category, confirming the need to implement prevention and protection services for all workers (11).

Most of the communicable occupational diseases at the MoD did not result from deliberate high-risk work; the infection occurred accidentally after contact with infectious agents during risk-free work (12). The number of infections is influenced by the deployment of units in foreign missions with a different epidemiological situation in the place of action. In our conditions,

the incidence of infections is influenced by epidemics of scabies in healthcare facilities, but the work there has been adequately categorized as at risk. Preventive measures against infectious diseases include vaccination (e.g., typhoid, viral hepatitis A and B, rabies, yellow fever, cholera) depending on the destination, consistent chemoprophylaxis in the case of malaria, disinfection and disinsection. Individual prevention plays a key role, including personal hygiene, drinking regime and dietary recommendations, and the use of protective equipment (mosquito nets, repellents, insect traps, treatment of equipment). Medical fitness, which is assessed during the OME, including the adequate physical condition to cope with the task set, is important. Lyme disease and tick-borne encephalitis are linked to the transmission of infection from tick to human in nature, so the risk is not only the training of soldiers in field conditions but also forestry activities of civilian employees, even if the work has not been categorized as a high-risk job. Preventive measures include the consistent use of repellent products when outdoors and the vaccination against tick-borne meningoencephalitis, which is compulsory for professional soldiers. Some employers in the Czech Republic pay for this vaccine for their employees within the occupational medical examination.

Tick-borne encephalitis (TBE) does not occur only in the Czech army. US military members residing in or traveling to Europe generally have a risk for TBE similar to that of other residents of the host nation. There were 8 individuals from the US army who met the case definition for TBE over the interval 2006–2018; so control measures such as active surveillance, enhanced personal protective measures, and vaccination must be performed (13).

Malaria infection remains an important health threat not only to Czech soldiers but also to US service members who are located in endemic areas. In 2020, a total of 28 service members were diagnosed with or reported to have malaria. This was the lowest number of cases in any given year during the 10-year surveillance period and represents a 15.2% decrease from the 33 cases identified in 2019 (14).

In terms of physical factors, most of the OD were caused by hand-arm vibration. Here, the majority (80%) were found to be overexposed when measured as part of the work categorization and the work was classified as high-risk. In contrast to the OD arising due to excessive RSI, where the work was initially categorized as risk-free, when verifying the working conditions by the MHI (or by an accredited laboratory), it was found that the limit values were exceeded, which indicates an incorrect categorization. This problem is encountered not only at the Ministry of Defence but also in other workplaces in the Czech Republic. To prevent these OD, it is necessary to reduce the risk factor by alternating and changing unilateral repetitive movements, for example by rotating employees around individual workplaces (15), and to detect within the OME persons who are not medically fit to perform hazardous work. According to the analysis of data on musculoskeletal OD caused by work involving hand-arm vibration risk and risk of limb RSI in the Czech Republic in the years 2008–2018, it was found that these OD represent 47% of all identified OD and are largely associated with work in the hazard category (according to the RHS categorization) (16).

The low incidence of occupational noise-related diseases in the Czech Military Forests and Estates shows effective preventive measures, including suitable work categorization in foresters and the use of PPE. The categorization of work involving hazardous noise in professional soldiers is inadequate, with both cases of OD arising from activities that were not categorized, and thus PPE was not adequately used, and preventive audiometric hearing tests were not carried out to detect hearing loss early and possibly remove the soldiers from risk work.

Study of Swedish military pilots had elevated prevalence values of hearing impairment, 41% of the subjects had been exposed to noise exceeding the EU risk limit. Increased flight time/year and flying fast jets were associated with elevated risk of hearing deterioration (17).

Fortunately, no primary pulmonary occupational disease (excluding one example of lung tuberculosis) was diagnosed in the Czech army, but according to a US study conducted between 2009 and 2017, 127 consecutive military workers deployed to Iraq and Afghanistan suffered from common deployment-related respiratory diseases including asthma, intermittent laryngeal obstruction, rhinosinusitis, and deployment-related distal lung disease (18).

Due to the above-mentioned findings, categorization of the military service was changed in January 2020. In the Directive on Job Categorization issued by the Chief Hygienist of the MoD, the performance of the military service was categorized as high-risk work and thus, the number of persons at the MoD classified into the high-risk category increased. At the same time, changes were made to the OME system for professional soldiers.

There are no international data concerning occupational categories and occupational diseases available because such a type of occupational categorization is unique in the Czech and Slovak Republics.

CONCLUSION

The incidence of OD at the MoD in 2010–2019 was higher concerning the work classified as risk-free, which was associated with inadequate work categorization at the MoD. Diseases of the musculoskeletal system and peripheral nerves occurred exclusively in civilian employees of the MoD whose work involved a risk of hand-arm vibration and RSI. With a large variety of manual jobs, the risk is harder to identify and there are complications in measurement and categorization. The introduction of a new work categorization for professional soldiers in 2020, together with effective preventive measures (organizational and technological), could help to reduce the incidence of OD.

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Conflict of Interests

None declared

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