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Characteristics of Nonfatal Occupational Injuries in the Republic of Srpska

ABSTRACT

Introduction: Occupational injuries are one of the greatest public health problems worldwide, including our country. According to the International Labour Organisation, 4% of gross domestic income is lost on treatment, rehabilitation and other consequences of occupational injuries and illnesses.

Materials and methods: Research was conducted by retrospective epidemiologic study based on the data delivered by the Ministry of Labour, War Veterans and Disabled Persons Protection to the Institute of Occupational and Sports Medicine of the RS. Test sample includes 2512 registered occupational injuries.

Results: The average incidence of nonfatal occupational injuries is 349.7/100 000 employees per year, which is lower than in surrounding countries and in the EU. Men incur the highest number of injuries and the employees aged 51-60 have the highest number of injuries. Employees older than 60 get injured most often, twice the average. There is a statistically significant difference in the frequency of injuries in relation to gender and age. The highest incidence rate is in the following activities/sectors: mineral and stone excavation + electricity, gas, steam and air-conditioning production and supply (B+D) followed by healthcare and social work activity (Q) and transport and storage (H). These rates are lower than in surrounding countries. Unexpectedly low rates are found in: civil engineering, agriculture and forestry and in processing activity. Injuries to the lower and upper and extremities, followed by the head, are most common.

Conclusion: The data do not give a completely realistic overview of the injuries and the state of occupational safety because occupational injuries are not regularly reported in all sectors/activities, especially in private ownership. Therefore, it is necessary to increase inspection control and to sanction unconscionable employers. This indicates the need to set up a unique register and unique software of occupational injuries, which will be managed by a referring institution of occupational medicine for the purposes of the RS. It is necessary to adjust the records to the records of the European Institute for Statistics (Eurostat) and International Labour Organisation (ILO), to modernise and adjust regulations and definition of occupational injury.

Key words: nonfatal occupational injury, incidence, frequency, register

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Introduction

Occupational injuries are one of the greatest public health problems worldwide. According to the statistical results, average number of occupational injuries in industry worldwide is 50 million a year. 160 000 injuries are reported daily. Annually, 100 000 people die from occupational injuries while 1.5 million people become disabled.¹

In 2012, there were slightly less than 2.5 million nonfatal occupational injuries in the European Union (EU) resulting in at least four calendar days of work absence and 3 515 fatal injuries.¹

Occupational injuries can permanently damage health and lead to the decrease of general living and working ability. The causes of occupational injuries are usually very complex: human factor (age, gender, professional qualification, experience, acute and chronic diseases, emotional state, alcohol, drugs, medicines), environmental factors (physical: lighting, temperature, noise, vibrations; psychological: interpersonal relations, mobbing; organisation of work: working hours, breaks, vacations, rhythm of work, occupational safety, etc.) and socio-economic factors (standard of living, residence, nourishment, qualifications).²⁻⁵ Every occupational injury is a huge loss for individuals, their families and for the entire social community. According to the assessment of the International Labour Organisation, about 4% of the gross domestic product is spent on the expenses resulting from occupational injuries and illnesses.¹

During the last twenty and more years, especially in transitional countries, such as our country, there have been series of negative effects on the society in general, on social security, recruiting, working and living environment due to the trends of globalisation, competition and global economic crisis. Transitional countries suffered the collapse of huge enterprises which had well-organised occupational protection and health, followed by the increase of a number of small enterprises, the loss of legal security of employees, increase of unemployment, a part-time or temporary employment without an adequate professional training and occupational safety, an increase of illegal employment, decrease of quality of the office of the occupational medicine and an increased employers' negligence for the occupational safety and health, which resulted in the increased number of occupational injuries, illnesses and disabilities even in conditions of decreased production and productivity.

Aim of the study

The aim of this research is to show characteristics of non-fatal injuries in the Republic of Srpska (RS): number and index of reported nonfatal occupational injuries in relation to gender, age of employees, part of body injured and activity/sector of an injured person and to assess the state of it.

Materials and methods

This research was conducted by retrospective epidemiologic study based on the data delivered by the Ministry of Labour and War Veterans and Disabled Persons Protection from the form "Report on the occupational injury"⁶ to the Institute of Occupational and Sports Medicine of RS. Test sample included 2512 reported occupational injuries for the period 2012-2014. The following variables were used: gender, age, part of body injured and the work activity of an injured person. The incidence of the nonfatal occupational injuries was determined in relation to 100 000 employees. The incidence of nonfatal injuries by activities/sectors was determined in relation to 1000 employees.^{7,8} Data on the number, gender, activity /sector of employees were received from the Statistical Office of Republic of Srpska.⁹ The classification of activities is in accordance with the EU classification to the extent allowed by the available data from the ministry. The difference between the total number of employees and the total number of employees by activities/sectors is related to the entrepreneurs since the Statistical Office of Republic of Srpska does not have information on the number of employed entrepreneurs by sectors, and among the reported occupational injuries there weren't any related to the entrepreneurs so these employees were excluded from the analysis. Certain number of individual reports on occupational injuries registered several injured body parts.

All data were entered into the database of the medical statistical package and the parameters of descriptive and analytic statistics were analysed (mean value, standard deviation, minimal and maximal value, frequency, chi-square test (X^2)). When the value of probability among the analysed groups was $p < 0.05$, the difference was regarded as statistically significant.

Results

During this 3-year period, a total of 2512 injuries were reported, approximately $X = 837.3$ (SD=28.9) a year, the average incidence of occupational injuries in RS is $X = 349.7/100\ 000$ (SD=9.5) a year and it is equalised for all three years. The structure of employees, number and incidence of occupational injuries by gender and years of observation is shown in Table 1.

Men incurred the highest number of occupational injuries, 1748 (69.6%) and women 764 (30.4%). Men account for approximately $X = 582.7$ (SD= 25.7) occupational injuries a year and women $X = 254.7$ (SD=17.9). Men get injured more often. The average annual incidence of the occupational injuries for men is 432.1/100 000 and for women 243.4/100 000. There is a statistically significant difference between the frequencies of occupational injuries of men compared to women according to the number of employees ($\chi^2 = 62.69$ DF=1; limit value 3.84; $p < 0.05$).

Table 1. The structure of employees, number and incidence of occupational injuries by gender and years of observation

Year	Employees (E)			Injuries (In)					
	Gender		Total (T)	Gender			Total (T)		
	M No (%)	F No (%)		M No (%)	IM	F No (%)	IF	No	I
2012	135 025 (56.7)	103 153 (43.3)	238 178	596 (71.7)	436.9	235 (28.3)	227.8	831	348.9
2013	134 004 (56.2)	104 636 (43.8)	238 640	599 (68.9)	447.0	270 (31.1)	258.0	869	364.1
2014	135 488 (56.1)	106 056 (43.9)	241 544	553 (68.1)	408.2	259 (31.9)	244.2	812	336.2
T	404 517 (56.3)	313 845 (43.7)	718 362	1748 (69.6)	432.1	764 (30.4)	243.4	2512	349.7
X	134 839 (56.3)	104 615 (43.7)	239 454	582.7(69.6)	432.1	254.7(30.4)	243.4	837.3	349.7

Legend: M - male; F - female; IM - incidence InM/100 000 EM; IF – incidence InF/100 000 EF; I - incidence of injuries/100 000 E; T - total; X - mean

Table 2. shows that the employees aged 51-60 had the highest number of occupational injuries, approximately $X=233.6$ ($SD=24.4$) a year, i.e. 27.5%, followed by employees aged 41-50, $X=217$ ($SD=13$) or 25.9%, employees aged 31-40 with $X=203.3$ ($SD=4.9$) or 24.3% and in employees over 60 $X=70.3$ ($SD=7.5$), i.e. 8.4% of occupational injuries. Not a single occupational injury was registered in those under 20. There is a statistically significant difference between the frequency of injuries by age ($\chi^2 = 60.64$; $DF=4$; limit value 9.49; $p < 0.05$).

However, if we observe the average annual incidence rate of occupational injuries in relation to the age of employees, the highest one is in the age group of over 60 (8.7/1000 of this group's employees) and it is twice as high than the average incidence rate (4.1/1000).

Table 2. Frequency of occupational injuries by age groups

Year	2012-2014 (X)				
	Employees		Injuries		
Age group	X	%	X	%	I
<20	91	0.04	-	-	-
21-30	32794	16.2	113	16.2	3.4
31-40	60822.7	30.0	203.3	24.3	3.3
41-50	53495	26.4	217	25.9	4.0
51-60	47331.7	23.4	233.6	27.5	4.9
>60	8099.3	4.0	70.3	8.4	8.7
Total	202 633.7	100	837.3	100	4.1

Legend: X – mean, % - percentage; I – injury incidence rate /1000 employees

During this 3-year period, the lower extremities (hip, legs, foot) were most frequently injured and they make up 1265 (37.3%) of injuries, followed by the upper extremities (shoulder, arm, hand) with 1243 (36.6%) injuries. Injuries

of both extremities account for 73.9%, head injuries 10.8%, chest 3.5% and eye 3.6% of all injuries. (Table 3.).

Table 3. Distribution of occupational injuries by part of body injured

Part of body	Total Number	%
Legs	1024	30.2
Hands	679	20.0
Arms	476	14.0
Head	365	10.8
Feet	198	5.8
Spine	148	4.4
Eyes	121	3.6
Chest	120	3.5
Shoulder	88	2.6
Hip	43	1.3
Multiple injuries	64	1.9
Abdomen	62	1.8
Lungs	1	0.03
Total	3389*	100

Remark:* registered number of body part injuries is higher than the number of reported occupational injuries because a certain number of the “Report on occupational injury” registered two or more body parts injured.

The distribution of injuries by activities/sectors is shown in Table 4. The highest number of all reported injuries is in the healthcare sector (Q), 22.2%. The highest incidence rate of occupational injuries per 1000 employees is reported in the sector of mineral and stone excavation + production and electricity, gas, steam and air-conditioning production and supply (B+D) and it amounts to 15.4, than in the healthcare sector (Q), 11.7/1000. The lowest incidence rates are in civil engineering (F) 1.2/1000 employees in this sector and in the trade sector (G) and it amounts to 0.6.

If we analyse the data by years, we can notice the tendency of slight increase in the number of occupational injuries in healthcare sector and a decreasing tendency in mineral excavation + electricity, gas, steam and air-conditioning production and supply sector.

Table 4. Distribution and frequency of occupational injuries by sectors

year	2012-2014 (X)				
	employees		injuries		
CS	x	%	x	%	I
Q	16 630	8.2	195.7	22.2	11.7
B+D	12266	6.05	189.3	21.0	15.4
N+O	26177	12.9	100.3	11.4	3.8
C	46915.7	23.2	154	17.5	3.2
H	11160.3	5.5	109.7	12.1	9.8
J	5091.7	2.5	13	1.5	0.25
F	11225	5.5	14.3	1.6	1.2
A	7970.3	3.9	78	8.8	0.97
G	44211.7	21.8	27.3	3.1	0.6
T*	202633.7	89	881.6	100	4.3

Legend: X- mean; % - percentage; I- incidence (rate per 1000 employees); T- total number without entrepreneurs; CS - classification of sectors; Q - healthcare and social work sector; B+D - mineral and stone excavation + electricity, gas, steam and air-conditioning production and supply; N+O administrative and supplementary service industries + public administration and defence, obligatory social security; C - processing industry; H - transport and storage; J - information and communications; F -civil engineering; A - agriculture, forestry and fishing; G - wholesale and retail trade, repair of motor vehicles and motorcycles.

Discussion

In the Republic of Srpska, occupational injury is defined by legal regulations¹⁰, but unlike surrounding countries and the EU countries, it is not specified whether all injuries are reported or only those resulting in absence from work.⁶

During the observed 3-year period, total number of reported nonfatal injuries is approximately the same every year, with average incidence of 349.7/100 000 employees (SD= 9.5). If these results are compared with the results of surrounding countries, it can be noted that the incidence of injuries in Croatia,¹¹ Serbia,¹² Federation of BH (Tuzla Canton)¹³ and in the EU countries is greater, except in Romania and Bulgaria with the incidence lower than 100/100 000.¹ However, due to different criteria for reporting injuries and keeping registers, data comparison is unreliable. Since

2013, EU countries have been registered injuries using the statistical methodology ESAW, which contains data on the occupational injuries leading to the absence of more than 3 days from work. These data are only related to the injuries which occurred during work and usually to the injuries in traffic accidents while working. In Federation of BH (Tuzla Canton), the injuries resulting in 1 day of absence from work are being reported,¹³ in Serbia, injuries resulting in 3 days of absence from work, and in Croatia, as well as in other countries in the EU, 3 days of work absence.¹¹

Our epidemiological reports on frequency of injuries by gender of employees do not differ from the reports of most of the surrounding countries and the countries of EU. Men get injured more often (in the RS men incur 69.6% of injuries and, in EU, 78.5%).^{1,11,12} However if we analyse the data related to the age of people injured, our epidemiological reports differ. Slightly more than half of the registered injuries in the RS relate to the employees aged 41-60 and in Croatia and Serbia, slightly more than half of the injuries in 2012 relate to the employees aged 30-49.¹¹⁻¹² In the countries in the European Union, the number of injuries decreases with the age of the employees.¹ The smallest number of injuries in the RS is registered in the age group of over 60. However, people over 60 get injured most frequently in relation to the number of employees, almost two times more often than in all observed age groups. There were no registered injuries in employees under 20. This was not the result expected and it is contradictory to the present findings from the professional literature,⁷ and is probably a result of illegal work. The most vulnerable group in the RS are employees older than 60. The reasons for that also lie in the fact that employers avoid necessary trainings for safe and sound work and for employees' professional knowledge. Also, people able to work are getting older, since the age for retiring is 65 thus prolonging the working life of population that lost the jobs they had been trained for more than two decades ago due to transition war, and migrations, in most cases they were not trained for the second job that they actually do, and in this age group certain functions physiologically weakened with aging, especially the eyesight, hearing, speed of reflexes, coordination, memorising fresh information and concentration, and there are more chronic conditions and degenerative changes so the workplaces should be adjusted to the health capabilities of those workers.

Within EU - 28 (with 28 members), slightly less than half (47.8%) of all nonfatal occupational injuries in 2012 occurred in the sectors of civil engineering, production, transport and storage, agriculture, forestry and fishing, while that percentage is a bit lower in the RS (40%). The incidence rate in civil engineering in the RS is unrealistically low, 1.2/1000 employees. Unexpectedly, the highest number of injuries in the RS is reported in healthcare (22.2%), while high number is also reported in administrative and supplementary service industries and in public ad-

ministration with 17.5 % of reported injuries. These results for the RS can be explained by the fact that the mentioned industries are in most cases owned by the state so the registers and the reports on the occupational injuries are kept more promptly. Additionally, in healthcare, during the last few years, injuries caused by sharp objects have been reported as work-related regardless the health risk of blood exposure and other body fluids, since there is no regulation in our country which could regulate the way of record keeping and implementation of the protective measures in order to prevent injuries resulting from sharp objects for health workers. Slight increase in number of injuries is reported in healthcare probably due to reasons previously-mentioned, and there is slight decrease in mining and energy which, probably, cannot be attributed to better work protection but to the tendency of avoiding to report occupational injuries. According to the statistical results, the highest number of employees in the RS work in privately-owned companies,⁹ and according to legal regulations from this area, employees achieve all rights resulting from the occupational injury at the employers' charge, making it one of the most common reasons for poor record-keeping and avoiding to report injuries at work. All this as well as illegal work give unrealistic image when it comes to occupational injuries, especially in sectors/activities where, according to former experience, occupational injuries occur more often (civil engineering, forestry, agriculture). The most frequent injuries in the RS are those of the lower extremities and in Serbia, Croatia and Federation of BH upper extremity injuries are the most frequent ones.¹¹⁻¹³

Conclusion

During the 3-year observation period, the average incidence rate of nonfatal occupational injuries in relation to the employees (349.7/100 000) is lower than in the surrounding countries and in the European Union. Men were significantly more likely than women to suffer from injuries. The highest incidence rate of occupational injuries per 1000 employees is at the age of over 60. Extremities and head are parts of body injured most often. The highest incidence rate is in the sector/activity of mineral and stone excavation + electricity, gas, steam and air-conditioning production and supply (B+D), followed by healthcare and social work sector (Q) and transport and storage (H). These rates are lower than in the surrounding countries. Rates are unexpectedly low in sectors such as: civil engineering, agriculture and forestry and processing industry. This leads to the conclusion about irregular injury reports in all sectors/activities, especially in those privately owned. The data do not give completely realistic image of injuries and conditions of the occupational safety, so it is necessary to

increase inspection control and to sanction unconscionable employers.

The actual number of occupational injuries in the RS is not known due to the lack of a system for their monitoring and comparison. The existing registers are not systematised, they are imprecise and incomplete, so it is necessary to establish a unique register of fatal and nonfatal occupational injuries with unique software.

By doing so, it would make possible to conduct all necessary analyses of the data collected, perform their evaluation and propose strategies and measures for preventing and decreasing occupational injuries within the referent republic institution of occupational medicine. It is also necessary to bring the records of occupational injuries into line with the records of the European Institute for Statistics (Eurostat) and International Labour Organisation (ILO), so that our data could be compared with the worldwide data.

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Karakteristike nefatalnih povreda na radu u Republici Srpskoj

SAŽETAK

Uvod: Povrede na radu predstavljaju jedan od najvećih javnozdravstvenih problema u svijetu, pa tako i kod nas. Na liječenje, rehabilitaciju i druge posljedice povreda na radu i profesionalnih bolesti, prema Međunarodnoj organizaciji rada, gubi se 4% bruto nacionalnog dohotka.

Ispitanici i metode: Istraživanje je provedeno retrospektivnom epidemiološkom studijom, na osnovu podataka koje Ministarstvo rada i boračko-invalidske zaštite dostavlja Zavodu za medicinu rada i sporta RS. Uzorak čini 2512 evidentiranih povreda na radu.

Rezultati: Prosječna godišnja incidenca nefatalnih povreda na radu je 349.7/100 000 zaposlenih, niža nego u zemljama u okruženju i EU. Najčešće se povređuju muškarci, najveći broj povreda se desi zaposlenicima starosne dobi 51-60 godina, najčešće se povređuju radnici stariji od 60 godina, dvostruko više od prosjeka. Postoji statistički značajna razlika u učestalosti povređivanja u odnosu na pol i starosnu dob. Najveća stopa incidence je u djelatnosti vađenje ruda i kamena + proizvodnja i snabdijevanje električnom energijom, gasom, parom i klimatizacija (B+D), zatim u djelatnosti zdravstvena i socijalna zaštita (Q) i saobraćaju i skladištenju (H) i ove stope su niže nego u zemljama u okruženju. Neočekivano su niske stope u djelatnostima građevinarstvo, poljoprivreda i šumarstvo i prerađivačka djelatnost. Najčešće se povređuju donji i gornji ekstremiteti, zatim glava.

Zaključak: Podaci ne daju potpuno realnu sliku povređivanja i stanja zaštite na radu, jer se povrede na radu manjkavo prijavljuju u svim djelatnostima, naročito u djelatnostima u privatnom vlasništvu, zbog čega je neophodno pojačati inspeksijski nadzor i sankcionisati nesavjesne poslodavce. To upućuje na potrebu da se ustanovi jedinstven registar i jedinstven softver povreda na radu koji će za potrebe RS voditi referentna ustanova medicine rada. Neophodno je evidencije uskladiti sa evidencijama Evropskog zavoda za statistiku (Evrostat) i Međunarodnom organizacijom rada (MOR), osavremeniti i uskladiti propise i definiciju povrede na radu.

Ključne riječi: nefatalna povreda na radu, incidenca, učestalost, registar