INDIVIDUAL CHARACTERISTICS OF WORKERS INVOLVED IN OCCUPATIONAL ACCIDENTS

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The aim of this study was to analyze the individual characteristics of workers involved in occupational accidents. The examined group consisted of 1850 workers who had been involved in one or more occupational accidents in the last ten-year period. The control group consisted of 1750 workers who had not been involved in occupational accidents during the same period. The number of workers younger than the age 30, number of overweight workers, workers with alcohol consumption and was statistically significantly more frequent in the examined than in the control group. Workers with the practice of sporting activities were statistically significantly more frequent in the control than in the examined group. The number of workers with work experience less than five years was statistically significantly greater in the examined than in the control group. Workers with hearing disorders, poorly corrected vision disorders, sleep disorders and arterial hypertension was statistically more presented in the examined than in the control group. Reaction time to acoustic and visual stimulation was statistically significantly longer in workers in the examined than in control group.

The risk of occupational accidents depends on age, body mass index, hearing and visual disorders, sleep disorders, work experience, sporting activities, smoking and alcohol consumption habits. *Acta Medica Medianae 2005; 44(2): 5–10.*

Key words: *occupational accidents, individual factors, physical disorders, smoking habits, body mass index*

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Introduction

Occupational accident is an unexpected and unplanned occurrence, including acts of violence, arising out of or is in connection with work, which results in one or more workers incurring a personal disease or death. As occupational accidents we consider travel, transport or traffic accidents in which workers are injured and which arise out of work or in the course of work, i.e. while engaged in an agricultural activity. As occupational accidents are to be considered as accidents occurring on the habitual route, in either direction, between the place of work or work related training and the workers' principal or secondary residence, the place where the worker usually takes his or her meals, or the place where he or she usually receives his or her remuneration, which results in death or personal injury.

Occupational injury is any personal injury, physical damage to body tissues or death resulting from an occupational accident. Occupational injuries are more responsible for the absence from work and decrease in productivity than any other health condition. Injuries are the leading cause of morbidity and mortality among workers. Thousands of people are killed annually in industrial accidents, and the number of disabling injuries is also a staggering figure. Many workers suffered job related injuries that resulted in the absence from work, medical treatment, loss of consciousness, restriction of working ability or motion, or transfer to another job. Today, injuries continue to claim lives, jeopardize the physical and psychological well-being and decrease resources of workers and their families. The overall human, social, and financial toll of traumatic occupational injury is enormous, rivaling the burden imposed by such health threats as cancer and cardiovascular disease (1, 2 and 3). The direct cost (lost wages, medical and rehabilitation payments, insurance administrative costs, property losses, production losses) plus indirect costs (cost associated with pain and suffering by workers and family members) of occupational injuries were estimated to be about $ 30 billion annually (4). Work related trauma disorders result in persisting symptoms and difficulty in performing simple everyday

activities, impacting home life even more than work. Job loss, symptoms of depression and family disruption were common (5).

Intrajob workload, psychosocial factors and organizational factors are potential risks for work related injuries (6). Machinery related injuries were the second leading cause of traumatic occupational injuries and fatalities (7). Apart from environmental factors, other factors contribute, especially age (8) or alcohol consumption (9). Nevertheless, there have been few investigations into the role of individual characteristics in non-fatal occupational injuries in industry, and no one has taken into account several individual factors simultaneously.

The aim of this study was to analyze the individual characteristics of workers involved in occupational accidents.

Subjects and Methods

The present survey was conducted on 3600 male workers. The subjects were divided into two groups. The examined group consisted of 1850 workers who had been involved in one or more occupational accidents in the last ten-year period. Fatal injuries were excluded on account of the protocol. The control group consisted of 1750 workers who had not been involved in occupational accident in the same period.

The survey used a standardized questionnaire, which comprised date of birth, weight, height, years spent at the present job, smoking habits, alcohol consumption, sporting activities, physical disabilities, hearing disorders, vision disorders, sleep disorders (defined by duration of daily sleep, "sleeping badly", and regular consumption of sleeping pills) and reaction time to acoustic and visual stimuli measurements. Physical abilities and health status were assessed by the occupational physician, ophthalmologist, otorinolaryngologist, psychiatrist and psychologist. According to the results, the occupational physician had noted the presence or absence of disorders.

Body mass index was used to show the ratio of body weight (in kg) and height (in m^2). Values of body mass index lower than 18.4 kg/m^2 were considered the sign of underweight, values between 18.5 kg/m^2 and 24.9 kg/m^2 were considered the sign of normal weight and values over the 25.0 kg/m^2 were the sign of overweight.

The statistic significance of parameters between the examined and control group were estimated by the Student's t test and X^2 test.

Results

The number of workers younger than the age of 30 was statistically significantly higher in the examined (35.0%) than in the control group (27.4%) ($p < 0.05$) (Table 1).

The number of overweight workers in examined group (64.7%) was statistically significantly more frequent than in the control group (49.3%) ($p < 0.01$). The percent of underweight and normal weight persons was statistically significantly more present in the control than in the examined group (Table 2).

Table 1. Age of workers in examined and control group

Age(years)	Examined group		Control group		p
	Number	Percent	Number	Percent	
Under 30	648	35.0	479	27.4	<0.05
30-39	441	23.8	467	26.7	n.s.
40-49	437	23.6	462	26.4	n.s.
Over 50	324	17.5	342	19.5	n.s.
Total	1850	100.0	1750	100.0	

Table 2. Body mass index in workers of examined and control group

Body mass index(kg/m^2)	Examined group		Control group		p
	Number	Percent	Number	Percent	
Under 18.4	205	11.1	298	17.1	<0.05
18.5-24.9	447	24.2	589	33.6	<0.01
Over 25.0	1198	64.7	863	49.3	<0.01
Total	1850	100.0	1750	100.0	

Workers with alcohol consumption habits were statistically significantly more present in the examined than in the control group (Table 3).

Workers with the practice of sporting activities were statistically frequently presented in the control than in the examined group. The number of workers who had never taken part in sporting activities was statistically more present in the examined (74.6%) than in the control group (17.0%) ($p < 0.01$) (Table 4).

The number of non-smokers was statistically significantly higher in the control (58.9%) than in the examined group (15.0%). The number of current smokers was statistically significantly more present in the examined (65.9%) than in the control group (19.9%) ($p<0.001$) (Table 5).

The number of workers with work experience less than five years was statistically significantly higher in the examined (56.9%) than in the control group (38.6%) ($p < 0.01$). The number of workers with work experience more than six years was statistically more present in the control than in the examined group (Table 6).

Table 3. Alcohol consumption in examined and control group

	Examined group		Control group		p
	Number	Percent	Number	Percent	
Never	251	13.6	881	50.3	<0.01
Sometimes	782	42.3	564	32.2	<0.01
Almost every day	817	44.2	305	17.4	<0.01
Total	1850	100.0	1750	100.0	

Table 4. Sporting activities in examined and control group

	Examined group		Control group		p
	Number	Percent	Number	Percent	
Never	1381	74.6	298	17.0	<0.01
Sometimes	158	8.5	260	14.8	<0.05
Almost every day	311	16.8	1192	68.1	<0.01
Total	1850	100.0	1750	100.0	

Table 5. Smoking habits in examined and control group

	Examined group		Control group		p
	Number	Percent	Number	Percent	
Non- smokers	278	15.0	1032	58.9	<0.001
Ex- smokers	353	19.1	369	21.1	n.s.
Current smokers	1219	65.9	349	19.9	<0.001
Total	1850	100.0	1750	100.0	

Table 6. Work experience in examined and control group

Work experience (years)	Examined group		Control group		p
	Number	Percent	Number	Percent	
Under 5	1054	56.9	675	38.6	<0.01
6-10	191	10.3	261	14.9	<0.05
11-20	201	10.8	272	15.5	<0.05
21-30	193	10.4	267	15.2	<0.05
31-40	211	11.4	275	15.7	<0.05
Total	1850	100.0	1750	100.0	

Workers with hearing disorders, poorly corrected vision disorders, sleep disorders and arterial hypertension were statistically more present in the examined than in the control group (Table 7).

Reaction time to acoustic and visual stimulation was statistically significantly longer in workers of the examined than in workers of the control group ($p<0.001$)(Table 8).

Table 7. Physical disorders in workers of examined and control group

Physical disorders	Examined group N=1850		Control group N=1750		P
	Number	Percent	Number	Percent	
Hearing disorders	1301	70.3	345	19.7	<0.001
Poorly corrected vision disorders	1135	61.3	298	17.0	<0.001
Sleep disorders	495	26.7	69	3.9	<0.01
Arterial hypertension	845	45.6	321	18.3	<0.01
Without disorders	8	0.4	925	52.8	<0.001

Table 8. Reaction time to acoustic and visual stimulation in workers of examined and control group

up	Examined gro			Control group			P
	N	X(msec)	SD	N	X(msec)	SD	
Visual stimuli	1850	0.25	0.07	1750	0.23	0.05	<0.001
Acoustic stimuli	1850	0.18	0.02	1750	0.17	0.01	<0.001

Discussion

Our study showed that occupational accidents were statistically highly connected with workers' individual characteristics, especially young age, small working experience, overweight, the lack of sporting activities, hearing disorders, sleep disorders, vision disorders, arterial hypertension, alcohol consumption and cigarette smoking habits.

Of the factors studied, age was found to be connected with the occupational accidents.

The highest accidents' rates among younger workers were shown by other authors (10, 11,12,13,14 and 15). It has been well documented that age and accident rates are negatively related (probably because older workers are more experienced at job and have greater job knowledge, patience, and skills than younger counterparts. When injuries do occur, older workers are usually more severely hurt, and fatalities occur more frequently among older workers (12,13,14 and 15). Some studies have shown that older subjects find it more difficult to recover after an accident than younger subjects (16). Some of the possible reasons why younger workers may be at increased risk of occupational accidents are limited job knowledge, training and skills, and perhaps lesser sense of responsibility. These factors all point to the importance of safety attitudes in providing safety at work. Older workers are more satisfied with job and more likely to asses general housekeeping and checking of safety equipment. Older workers could be more knowledgeable and experienced, could display more positive attitudes to safety, and are possibly more committed to work than younger workers. Older workers are quite capable of learning safety regulations and safety system of work, and are willing to comply with safety regulations. Perhaps it is attributable to the fact that job knowledge structures increase with age and compensate for decline in ability. Several studies have shown that young workers are involved in occupational accidents due to the lack of experience (17). Young workers may be at increased risk for injuries in the workplace because they are often new at job, inexperienced, commonly unaware of their legal rights as workers. Compared with older workers, young workers tend to move in and out of the workforce and are usually employed in part-time, low paid jobs (17). Youth employment also tends to be seasonal, peaking during the summer months (13,14). The seasonal and sporadic nature of youth employment, along with frequent job changes, makes it difficult for young workers to obtain the sustained mentoring and experience needed to perform their job safety. It has been well established that age is associated with an employee work well-being, and specifically with job satisfaction (18).

The present study highlighted that overweight subjects had a higher risk to be involved in occupational accidents. It has been demonstrated that being overweight is associated with sleep disturbances and fatigue, and that it is a risk factor in occupational accidents (19). Moreover, a relationship between obesity and decreased stability has been found, and

weight excess has been implicated (20). Fatigue is known to alter gait and postural control (21), generating a change in postural muscle activation (22) and internal perturbation of the motor system, and thus, an increase in reaction time (23). Fatigue could delay restabilizing mechanisms in certain specific destabilization situations, even more so since destabilization is amplified by excessive weight.

Our findings also revealed that workers suffering from hearing and vision disorders had the increased risk for occupational accidents. These disorders are a known risk factor for occupational accidents and injuries (24). Moving objects represent a danger for persons who do not perceive urgency warning massages. Some studies have reported a relationship between hearing disorders and injuries (25). It has been demonstrated that the loss of hearing of more than 20 dB is a risk factor for industrial accident (24). Hearing disorders led to reduction in noise perception, particularly warning messages. The accidents could have been more serious, because the subjects could not set up strategies either to avoid them or to protect themselves.

Our study showed that the workers suffering from sleep disorders had a higher risk for being involved in occupational accidents. Sleep disorders lead to a decrease in vigilance, to increase in reaction time, and this impaired vigilance is associated with high risk of accident, all the more so when the task is monotonous (26).

The practice of sporting activities seems to have a positive impact on the prevention of occupational accidents and injuries. As to our knowledge, no study has investigated the beneficial effects of physical or sporting activities on the prevention of occupational injuries. Nevertheless, physical activities are known to improve health, particularly in older people (27)

The lack of work experience can be the contributing factor in the development of occupational injuries. Relevant training the new worker received and timely accurate education are needed to prevent occupational injuries (28). Efforts to prevent occupational injuries among new workers will benefit from action by employers, regulatory agencies, the community at large, and young workers themselves. Employers can develop safety training programs that address young workers' potential lack of experience and skills in recognizing and responding to hazards. The school of work programs has traditionally been focused on high skill jobs rather than types of workplaces where youths are more likely to gain employment. The requirements for becoming a skilled worker include meeting physical requirements for vision, hearing and coordination, participating in industrial vehicle training, and passing a test of knowledge and ability for job. As a part of every employee's safety training, each employee should be made aware of the hazards associated with that job. Safe working practices and rules should be clearly explained to workers and enforced when appropriate. To help supervisors know and understand the safety rules they are responsible for enforcing. Safety talks are a part of the ongoing safety.

These results indicate that arterial hypertension can be a contributing factor in developing of occupational accidents. Cardio-cerebral and vascular complications of arterial hypertension could explain these findings. The problem of drug therapy of arterial hypertension is also current. Some antihypertensive drugs cause vertigo, sleepiness, reduce attention, cause longer reaction time and changes of mental work capacity and psychological status (29,30).

Conclusion

The risk of occupational accidents depends on age, body mass index, hearing and visual disorders, sleep disorders, work experience, sporting activities, smoking and alcohol consumption habits. Furthermore, the occupational physician could encourage overweight workers to reduce their weight, the subjects with hearing, visual or sleep disorders to consult a specialist to solve their problems, and all the workers to practice sporting activities regularly, as they could prevent occupational accidents and injuries.

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INDIVIDUALNE KARAKTERISTIKE RADNIKA KOJI SU IMALI POVREDE NA RADU

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Cilj ovog rada je analiza individualnih karakteristika radnika koji su imali povrede na radu. Ispitivanu grupu je činilo 1850 radnika koji su imali bar jednu povredu na radu za period od poslednjih 10 godina. Kontrolnu grupu je činilo 1750 radnika koji u ispitivanom periodu nisu imali ni jednu povredu na radu. Broj radnika mlađih od 30 godina, broj gojaznih radnika, broj radnika koji konzumiraju alkohol i puše cigarete bio je statistički značajno veći u ispitivanoj nego u kontrolnoj grupi. U kontrolnoj grupi je bio statistički značajno veći broj radnika koji upražnjavaju sportske aktivnosti nego u ispitivanoj grupi. Broj radnika sa radnim iskustvom manjim od 5 godina bio je statistički značajno veći u ispitivanoj nego u kontrolnoj grupi.U ispitivanoj grupi je bio statistički značajno veći broj radnika sa oštećenjem organa čula sluha, oštećenjem čula vida, poremećajima spavanja i arterijskom hipertenzijom nego u kontrolnoj grupi.Vreme reakcije na akustičku i vizuelnu draž je u ispitivanoj grupi bilo statistički značajno duže nego u kontrolnoj grupi. Rizik za nastajanje povreda na radu zavisi od starosti radnika, indeksa uhranjenosti radnika, oštećenja čula vida i sluha, poremećaja sna radnika, radnog iskustva, upražnjavanja sportskih aktivnosti, navike pušenja cigareta i konzumiranja alkohola.
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***Ključne reči**: povrede na radu, individualni faktori, oštećenja zdravlja, pušenje cigareta, indeks uhranjenosti*