

PROFESSIONAL ILLNESSES IN MINERS CAUSED BY HEAVY METALS AND TOXIC SUBSTANCES

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Abstract - The exposure of humans in an environment contaminated with heavy metals is associated with many diseases, characterized by pathological changes in the respiratory tract, lung function deterioration. The results of the research, conducted with miners working in the "Sasa" lead and zinc mine, were focused on validating the existing professional risk. Most affected are the miners engaged in drilling head and ore. Disease was verified by analysis of acute symptoms. According to the time of exposure, disease symptoms were most frequent after exposure from 1 to 3 years. This indicates that a short span of exposure can be dangerous for some organs, depending on individual hypersensitivity. The most common lung diseases in exposed workers are, chronic bronchitis and tracheitis, chronic obstructive lung disease, pneumoconiosis and silicosis. The multidisciplinary elaboration of the topic, suggests the need for a more serious approach to this important phenomenon (ecotoxicological impact of heavy metals in exposed workers), and also is a specific model that is capable of application and in other related research.

Key words: Professional exposure, ecotoxicology, hospitalization, preventive measures

INTRODUCTION

The paper addresses a current topic in the field of ecotoxicology. Considering the fact that urban living today is in direct correlation with the rapid growth of many industries, biomonitoring is becoming an integral part of preventive medical surveillance in occupations with actual or potential ecotoxicological hazard. The concept of professional risk involves the probability that because of the exposure of workers to certain harmful agents in the work environment, negative effects on their health and life will manifest. The concept of this research was to determine the need for biological monitoring as a set of activities to identify and quantitatively determine the concentrations of heavy metals (lead, zinc and cadmium), their primary or secondary metabolites in biological forms such as blood, in a specified category of pro-

fessionally exposed workers. In addition, we wished to define the concept of exposure efficiency, the effective consequences of toxicants that enter the body in different ways, their toxic effect (inhibition of enzymes, damage of cell membrane) and the dynamics of transport, distribution and excretion of individual metals from the body. People are exposed to mixtures, not single chemicals. Although various substances may have entirely independent actions, in many cases two substances may act at the same site in ways that can be either additive or nonadditive. Many even more complex interactions may occur if two chemicals act on different but related targets. In extreme cases, there may be synergistic effects, in which case the effects of two substances together are greater than either effect alone. In reality, most persons are exposed to many chemicals, not just one or two, and therefore the effects of a chemical mixture

are extremely complex and may differ for each mixture depending on the chemical composition. This complexity is a major reason why mixtures have not been well studied. In this review, we attempt to illustrate some of the principles and approaches that can be used to study the effects of mixtures.

Aims of the specialized labor explains the concept of professional risk involves probability that as a result of exposure of workers to certain harmful agents in the work environment will manifest negative effects on their health and life. Also, to represent toxicological effects of the heavy metals and other toxicological substances, the correlation between professional exposure and chronic and acute disease on the miners, such as respiratory tract diseases, including asthma, eye irritation as frequent symptoms.

MATERIALS AND METHODS

The results of the research, conducted with miners working in "Sasa" the mine of lead-zinc mine (R. Macedonia), were focused towards validating the existing professional risk. The results and conclusions are made based on a three-year period of continuous biomonitoring of sensitive and vulnerable categories of workers. The research included 60 miners as professionally exposed workers, a control group of 31 participants that included individuals who were not directly exposed to heavy metals, while living in the immediate vicinity of the mine lead and zinc.

RESULTS

Table 1. Tabular representation of the exposure and control groups according to age

Ages	Exposed group	Control group
20-25	1	1
26-30	8	1
31-35	13	4
36-40	15	11
41-45	15	7
46-50	6	6
51-55	2	1
Total	60	31

Table 2. Tabular overview of workers from the exposure group

Ages	Number of miners
20-25	1
26-30	8
31-35	13
36-40	15
41-45	15
46-50	6
51-55	2
Total	60

Table 3. Chart showing the workers of the exposure group according to time of exposure

Year of exposure	Number of miners
1-5	21
6-10	20
11-15	10
16-20	6
21-25	3
Total	60

CONCLUSION

Nearly 85% of workers with long exposure were found to be suffering from respiratory diseases, asthma and respiratory infections. Nearly all workers complained of headache. These findings point to the need of a multidisciplinary elaboration of the topic and for a more serious approach to this important. Although personal protective equipment such as overalls and safety boots, helmets and masks are normally used by mine workers, they are in bad condition and health.

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Table 4. View the control group by age

Ages	Number of participants in control group
20-25	1
26-30	1
31-35	4
36-40	11
41-45	7
46-50	6
51-55	1
Total	31

Table 5. Review of people from the exposure and control groups according to smoking habits

	Exposed group	Control group	Exposed group	Control group
Smokers	27	16	45%	51,6%
Nonsmokers	33	15	55%	48,4%
Total	60	31	100%	100%

Table 6. Prevalence of acute symptoms during work shift of workers from the exposure group separately in smokers and nonsmokers

Symptoms	Total	Smokers	Nonsmokers
Cough	32	22	10
Irritation of the throat and nose	21	12	9
Dry throat	26	14	12
Irritation of eyes	14	8	6
Clogged nose	12	8	4
Secretion	3	2	1
Strangulation	17	10	7

Table 7. Prevalence of acute symptoms during work shift of workers from the exposure and control group

Symptoms	Total	Exposure group	Control group
Cough	38	32	6
Irritation of the throat and nose	22	21	1
Dry throat	29	26	3
Irritation of eyes	14	14	/
Clogged nose	12	12	/
Secretion	3	3	/
Strangulation	17	17	/

Table 8. Prevalence of acute symptoms in smokers from the exposure and control group

Symptoms	Toatal smok- ers 42	Esposure group smokers 27	Control group Smokers 16
Cough	26	22	4
Irritation of the throat and nose	13	12	1
Dry throat	16	14	2
Irritation of eyes	8	8	/
Clogged nose	8	8	/
Secretion	2	2	/
Strangulation	10	10	/

Table 9. Prevalence of acute symptoms during work shift among nonsmokers in the control and exposure group

Symptoms	Total nonsmokers 48	Exposure group nonsmokers 33	Control group nonsmokers 15
Cough	12	10	/
Irritation of the throat and nose	9	9	/
Dry throat	13	12	1
Irritation of eyes	6	6	/
Clogged nose	4	4	/
Secretion	1	1	/
Strangulation	7	7	/

Table 10. Prevalence of chronic respiratory symptoms in the exposure and control group

	Exposure group 60		Control group 31	
	total	%	total	%
Chronic cough	44	73.4%	6	19.35%
Chronic bronchitis	21	35%	1	3.22%

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