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ФУНДАМЕНТАЛЬНЫЕ ОСНОВЫ ИННОВАЦИОННОГО РАЗВИТИЯ НАУКИ И ОБРАЗОВАНИЯ

Материалы международной научно-практической конференции (68-ой годичной), посвященной «Годам развития села, туризма и народных ремёсел (2019-2021)»

Том-2

Душанбе

27 ноября 2020 года

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ И СОЦИАЛЬНОЙ ЗАЩИТЫ НАСЕЛЕНИЯ РЕСПУБЛИКИ ТАДЖИКИСТАН

ГОУ «ТАДЖИКСКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ им. АБУАЛИ ИБНИ СИНО»

ЗАМИНАҲОИ БУНЁДИИ РУШДИ ИННОВАТСИОНИИ ИЛМ ВА ТАЪЛИМ

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FUNDAMENTAL BASICS OF INNOVATIVE DEVELOPMENT OF SCIENCE AND EDUCATION

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OCCUPATIONAL HEALTH RISKS OF WORKERS IN THE METALLURGICAL INDUSTRY

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Summary. Occupational activity is known to be associated with the possibility of developing occupational diseases under the influence on the workers' organism of adverse factors of the production environment and the labor process [1]. From the standpoint of occupational medicine, ferrous metallurgy is characterized by the presence of numerous sources of occupational hazards: dust, gaseous toxic substances, radiant and convective heat, noise, vibration, electromagnetic and magnetic fields, high severity and intensity of work [2, 3].

The aim of the study. Assess occupational risks to the health of workers employed in the metallurgical industry.

Materials and methods. To study the occupational risks to the health of workers employed in the metallurgical industry in Zaporozhe region and the leading metallurgical enterprise there were collected, analyzed and summarized materials on occupational diseases: "Journals of occupational diseases" (F. № 363) and "Records of occupational disease (poisoning)"(F P-5). 513 cases of occupational morbidity were registered in Zaporozhe region and 70 cases were selected at the investigated metallurgical enterprise. Their analysis on absolute and intensive indicators was carried out on 10 thousand workers, the nosological structure, structure depending on length of service and age of workers on area and on the investigated enterprise is defined.

Research results and their discussion. The metallurgical complex of Zaporozhe region includes ferrous and non-ferrous metallurgy enterprises, it is a complete technological system consisting of enterprises of extraction and processing of iron ore, production of coke and ferroalloys, smelting of cast iron and steel, as well as rolled enterprises. The largest number of cases of occupational pathology is registered at ferrous metallurgy enterprises and occupies 77,84 % of the total number of cases in metallurgy, the last 9,3 % of cases are registered in non-ferrous metallurgy.

It is established that 169 cases of occupational diseases were registered at metallurgical enterprises of the region, which amounted to 87,1 % of the total number of cases in the region. In the structure of occupational morbidity by nosological forms, the largest percentage is accounted for dust pathology – 42,3 %. The next ranking is occupied by vibration-noise pathology – 40,5 %, of which 21,9 % is vibration disease and neurosensory deafness – 18,6 %. In third and fourth place there are diseases of the musculoskeletal system, namely deforming arthrosis, which are – 7,4 % and radiation cataracts 5,6%. Among occupational diseases, which have a small percentage in the structure, there is polyneuropathy – 3,2 % and chronic chemical intoxication – 0,9 %. The largest number of victims are males – 70,7 %, cases reported in women amounted to 29,3 %.

The largest share among the victims was made by workers aged 50−59 – 46,2 % and aged 40−49 – 37,8%, and also the share of victims over 60 was high – 8,3%. The lowest percentage had employees aged 30−39, respectively 7,7 %. The average age of employees with registered cases of occupational disease was 50±0,6 years.

If we take into account the length of service in the conditions of harmful and dangerous production factors, the diagnosis of occupational disease is established in 5,7 % of employees with work experience up to 10 years, 27,1 % − with work experience 10−19 years, 41,8 % - with work experience of 20−29 years and 25,3 % − with work experience of more than 30 years. The average length of service of employees with an established occupational disease was 24,2±0,7 years.

The analysis of occupational morbidity at the leading metallurgical enterprise shows that the largest number of them are respiratory diseases, the share of which is 43,3 % of the total number of cases. In terms of nosological forms, chronic obstructive pulmonary diseases occupy the largest share among respiratory diseases – 75,9 %, followed by dust and dust bronchitis – 20,7 %, and pneumoconiosis 3,4 %.

In second and third place in the overall structure are diseases caused by physical factors, namely vibration disease – 28,4 % and neurosensory deafness, which is 18 %. Other forms have a small number of cases and account for 4,5 % of diseases of the musculoskeletal system and 3,4 % of radiation cataracts.

In the analysis of occupational morbidity by etiological factors of the production environment that caused the disease, it was found that the largest number of cases in this company arose from exposure to industrial aerosols and dust – 54,1 %, among which the largest share is fibrogenic dust (free silicon dioxide) – 59 %. Occupational diseases caused by physical factors accounted for industrial noise – 16,7 %, general and local vibration – 23,6 %, physical and static stress – 4,2 %, exposure to infrared radiation – 1,4 %.

It was found that depending on the age of employees, the largest number was registered among employees aged 50−59 – 50 % and employees aged 40−49 – 34 %. A smaller number of cases were registered in employees over 60 years of age – 14 % and employees aged 30−39 years – 2 %. The average age of employees who were diagnosed with occupational diseases at this enterprise was 52,4±1,1 years.

Depending on the length of service of employees, it was found that the largest number of employees had a length of service of 20−29 years – 40 % and 30 years or more 36 %. Other cases were reported in workers with 10–19 years of service – 20 %, and the lowest number of cases was registered in workers with 10 years of experience – 4 %. The average length of service of occupational diseases at the enterprise was 27,1±1,3 years.

Among the victims, the largest number was registered in men – 64 %, the latest cases in women 36 %.

It was found that during the investigated period the largest number of cases of occupational diseases were registered in the following divisions of the enterprise: open-hearth shop – 22 %, smelting shop – 12 %, metallurgical furnace repair shop (MFRS) and agglomeration shop.

Occupational morbidity in the open-hearth shop in nosological forms did not differ from other departments and in the first place there are respiratory diseases – 47,1 %, the next ranks were occupied by vibration disease – 23,6 %, neurosensory deafness – 17,6 % and radiation cataract – 11,8 %. The largest number of cases was registered with crane drivers – 56,6 %, as well as with open-hearth steelmakers, steel bottlers, locksmiths and repairmen. The average age and seniority of employees who were diagnosed with an occupational disease were 48,4±2,6 and 27,1±2,5, respectively. Among the factors that caused the occurrence of occupational diseases, 55,5 % were industrial dust and industrial aerosols, 16,7 % each were industrial noise and vibration, and 11,1 % were infrared radiation.

Analysis of occupational morbidity in the smelting shop showed that the leading nosological form in this shop is respiratory diseases (50 %), in second place there are vibration disease and neurosensory deafness of 20 %, in last place goes radiation cataract, which amounted to 10 %. Cases were registered among such professions as crane driver, painter, site foreman, among which the largest number were crane drivers – 43 %. Among the main factors of the production environment

that caused occupational diseases, fibrogenic dust, which contains free silicon dioxide and chemicals in the air of the work area, is 63,6 % of cases, 18,2 % of cases are caused by vibration and 9 % of cases are caused by exposure to infrared radiation and industrial noise. The average age and length of service of workers with occupational diseases was 52,7±1,3 years and 22,3±3,4 years, respectively.

In the MFRS there were registered cases among such professions as refractories, locksmith-repairman and site foreman. Occupational respiratory diseases account for 80 % of the total number in the shop, the other 20 % account for neurosensory deafness. The average age and seniority of employees with an occupational morbidity is 48±1,4 years and 20,8±1,8 years, respectively. The main factor that contributed to the emergence of occupational diseases in this shop is fibrogenic dust of free silicon dioxide and industrial aerosols – 80 % of cases.

Conclusions. The main industry that forms occupational morbidity in Zaporizhia region is the metallurgical industry – 87,1 %, among which more than half of cases were registered at ferrous metallurgy enterprises – 77,8 %. The main forms of pathology among employees of regional enterprises are dust pathology – 42,3 % and vibration-noise pathology – 41,4 %. The main reason for the formation of occupational diseases, respectively, is the dust and gassiness of the air of the working area (50,4 %). The largest number of occupational diseases is observed among people with work experience of 20−29 years – 42 %; depending on age at persons of 50−59 years – 43 %. The average level of occupational diseases at one of the leading metallurgical enterprises was 2,99±0,41. The largest share in the structure is occupied by diseases of the respiratory system (43,4 %), vibration disease (28,4 %) and occupational neurosensory deafness (18 %).

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CHANGES IN THE MOLECULAR STRUCTURE SEEDS OF TARAXACUM OFFICINALE WIGG DEPENDING ON THE INFLUENCE OF EXTERNAL FACTORS

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Relevance. The processes of the formation of the molecular structure of medicinal plants against the backdrop of constant biosphere pollution are affecting their medicinal properties, which is a topical task of life science. Almost all climatic zones - from subtropical to arctic - are found in a Tajikistan. The rock formations of the country contain all chemical elements which are evidently present in all links of the biosphere. Besides, annual summer dust storms are also a carrier of many harmful factors affecting the ecology of the region.

On the other hand, huge areas of glaciers in the mountains serve as the main link in the condensation of regional waste products and emissions, which are accumulated over time and then get into mountain rivers. Considering that mountain rivers are the main source of drinking water for the regions, they become the main carriers of precipitated particles that can cause changes in plants. Anthropogenic pollution of the environment can cause changes in plants at the chemical and anatomical levels [1]. One of the effective methods for studying these changes is IR spectroscopy.

The constituent parts (leaves, stems, and roots) of the dandelion (*Taraxacum officinale Wigg*) were studied by IR spectroscopy. It was found that the place of growth affects the process of structure formation of the plant [3], which in turn, affects their medicinal properties.

Aim. To conduct an IR spectroscopic study of plant seeds growing in various environmental conditions.

Material and methods. Dandelion seeds were collected from plants growing in various environmental conditions: near and far from the motorway. To obtain IR spectra, the samples were preliminarily washed with distilled water, then processed with CCL4 and dried at room temperature for a day in a desiccator. The dried sample was thoroughly grounded in a mortar. To record the IR absorption spectra, 10 mg of the test sample was thoroughly mixed with 600 mg of a spectrally pure KBr mono-crystal powder to get tablets, which were then pressed in a special poisson under vacuum. The IR spectra were recorded on a SPECJRD-75 IR two-beam spectrophotometer under the frequency range of 4000-400cm-1.

Results and discussion. Significant differences were observed in the IR spectra of samples collected in various locations with various environmental factors in the frequency range 1800-1200cm-1. The observed clear absorption band with Vmax at 1720 cm-1, characteristic of dandelion seed samples collected along and far from the highway of the city of Dushanbe. In the spectra of samples collected from the tributaries of the Siyoma River (Igizak, Big Igizak, and Small Igizak) it appears as a weak protrusion. The maximum of the absorption band 1620 cm-1 in the spectra of the samples shifts towards low frequencies by 20-30 cm-1 and lies at 1600 cm-1, while the half-width expands. Changes in the position of Vmax and the intensity of some bands lying in the frequency range of 1480-1200 cm-1 were also observed.

The observed changes in the position of the Vmax band of 1620 (+10) cm-1, related to the absorptions of the C = 0 (AMID-1) group in the spectra of dandelion seed samples collected along and far from the road, in comparison with the spectra of samples collected in other localities, possibly associated with the formation of carboxyl COOH groups during the formation of the structure.

To confirm the formation of strong intermolecular hydrogen bonds in the structures of the constituent parts of some samples of dandelion seeds, cation-exchange was carried out using copper sulfate salts (CuSO4). Comparative analysis of the IR absorption bands before and after cation exchange shows that there is a significant shift in Vmax characteristic bands.

The change in the position of the maximum of the IR absorption bands in the region of valent vibrations of hydroxyl groups (3800-3000 cm-1) included in inter- and intramolecular hydrogen bonds in the spectra of seeds after interaction with CuSO4 salts indicates a different strength of their hydrogen bonds [2] and characterize, as noted above, the specificity of the formation of the physicochemical structure of the constituent parts of organic substances of dandelion seeds in the process of biosynthesis.