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USE OF NOXOLOGICAL METHODS IN STUDYING HYGIENIC PROBLEMS OF PRESERVING THE HEALTH OF THE WORKING POPULATION

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Abstract

In modern conditions, the educational process should be aimed at ensuring the safety of life and health, which can be based on the knowledge accumulated by noxological science. The main goal of noxology is to deepen and develop knowledge about the security system in the conditions of the negative influence of the techno- and anthroposphere. In recent years, throughout the world, in connection with industrialization, the introduction of new technological methods, modern technological processes, the increase in production capacity, the construction of new enterprises in many industries, significant changes are occurring in the conditions and nature of work. All this ultimately affects human health and life.

Keywords: Environmental issues, innovations in education, noxology, impact factors, working conditions, hidden damage to health, reduction in life expectancy.

Introduction

The Resolution of the President of the Republic of Uzbekistan Shavkat Mirziyoyev “On measures to radically improve the system of training personnel in the field of medicine” indicates that it is necessary to create the necessary conditions for orienting the educational process towards the formation of practical skills, for the widespread introduction of advanced educational technologies, educational programs and innovative teaching and methodological materials based on international educational standards, ensuring a close connection between theoretical knowledge and practice in the activities of clinics and training facilities (No. PP-149 dated 04/22/2025).

In modern conditions, education in higher education institutions is aimed at maintaining health and ensuring the safety of human life in the environment. In this, noxological science has a special place. According to literary data, noxology (from noxo, noxius – translated from Latin as "danger, harmful, damaging") is a modern science about the dangers of the surrounding world, while the main goal of which is to deepen and develop knowledge about the security system in the conditions of the negative influence of the techno- and anthroposphere [1, 2].

In recent years, industrialization, the introduction of new technological methods, modern technological processes, an increase in production capacity, and the construction of new enterprises in many industries, including the production of aluminum profiles, have been taking place throughout the world. All this in turn affects the conditions and nature of work, health and human life. Taking into account the above, the integration of hygienic research together with innovative methods of noxology will allow determining not only classes of working conditions taking into account the levels of leading harmful factors in the workplace, but also potential threats to human life [5].

As a result of life activity, human health is affected by various factors, among which anthropogenic factors occupy a leading place. In addition to them, such factors as unfavorable working conditions, environmental factors, lifestyle and others are important. All of them to some extent lead to damage to health, that is, disruption of the integrity of the body or the development of occupationally-related diseases, as well as effects in the form of genetic changes, reproductive dysfunction, decreased mental stability, etc. [3, 4, 6, 7].

At present, an innovative direction in medical science has been the prediction of the possible development of various diseases and their complications, which ultimately can lead to a possible reduction in the life expectancy (RLE) in days of a specific person at the time of calculation, depending on the conditions of his work and life.

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During daily human migration in harmful living conditions, a dependence has been established for determining the total assessment of damage to health by calculating the time of reduction in life expectancy in days using the following formula:

$$RLE = RLEu + RLEl + RLEpc, \text{ where}$$

RLEu - reduction in life expectancy when staying in urban conditions in days;
RLEl – reduction in life expectancy when living in everyday conditions in days;
RLEpc – reduction in life expectancy when exposed to production conditions in days.

The presented methodology for quantitative determination of damage to health when working in unfavorable working conditions includes the following stages. An assessment of working conditions at the workplace is carried out for each harmful factor of the labor process and a class of harmfulness of working conditions is established according to the Hygienic Classification.

The determination of damage to health in the form of a reduction in life expectancy coefficient (Cpr) from the class of working conditions in production is based on the influence of harmful factors of urban and domestic environments on human health, usually carried out using more simplified indicators [1, 2].

According to the class of working conditions according to the Hygienic Classification, RLEpr is defined as:

$$RLEpr = (Dpc + Ds + Di) * (A – E), \text{ where}$$

Dpc - damage to health based on the assessment of the class of production conditions, days/year;
Ds - damage to health based on assessment of the severity of work, days/year;
Di – damage to health based on assessment of work intensity, days/year;
A – person’s age, year;
E – experience at commencement of employment, year.

In noxological science, the assessment of indicators of possible hidden damage to health based on the general assessment of the class of working conditions (also for the intensity of the work process) and the severity of work is presented in the following tables (Tables 1, 2) [1, 2].

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Table 1 Indicators of hidden damage to health based on the class of actual working conditions

No.	Actual working conditions	Class of working conditions	Damage, days per year (Dpc)
1.	One factor of class 3.1	3.1	2,5
2.	Two factors of class 3.1	3.1	3,75
3.	Three or more factors of class 3.1	3.2	5,1
4.	One factor of class 3.2	3.2	8,75
5.	Two or more factors of class 3.2	3.3	12,6
6.	One factor of class 3.3	3.3	18,75
7.	Two or more factors of class 3.3	3.4	25
8.	One factor of class 3.4	3.4	50,0
9.	Two or more factors of class 3.4	4	75,1
10.	Presence of class 4 factors	4	75,1

Table 2 Hidden damage to health based on the severity of the work process

No.	Actual working conditions	Class of working conditions	Damage, days per year (Dpc)
1.	Less than three class 2 indicators	2	-
2.	Three or more class 2 indicators	3.1	2,5
3.	One factor of class 3.1	3.1	3,75
4.	Two or more factors of class 3.1	3.2	5.1
5.	One factor of class 3.2	3.2	8,75
6.	Two factors of class 3.2	3.3	12.6
7.	More than two indicators of class 3.2	3.3	18,75

In order to use noxological approaches, we conducted research in 2024 in an aluminum workshop in Tashkent, which produces aluminum profiles. Laboratory data (protocols of measurements of harmful factors) of the laboratories of the Service of Sanitary and Epidemiological Welfare and Public Health were analyzed, on the basis of which the class of working conditions was determined in accordance with the Sanitary Rules and Norms of the Republic of Uzbekistan No. 0069-24 " Hygienic classification of working conditions based on indicators of harmfulness and danger of factors of the production environment, severity and intensity of the work process".

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During the study of the technological process, harmful factors of the production environment were identified: dustiness and gas contamination of the air in the working area, high air temperature, radiant heat and industrial noise. The leading factor is chemical. Thus, the maximum concentration of sodium hydroxide in the workplace was 0.8 mg/m^3 with a maximum permissible concentration (MPC) of 0.5 mg/m^3, aluminum hydroxide - 2.5 mg/m^3 with a MPC of 2.0 mg/m^3, carbon monoxide - 24.3 mg/m^3 with a MPC of 20 mg/m^3. In the aluminum shop during the warm season, the air temperature at the workplace reaches 38.8 degrees Celsius with the norm being 23-25 degrees Celsius. The intensity of thermal radiation from heat sources at the workplaces was equal to an average of 650.3 W/m^2 with the norm being 140 W/m^2. The maximum noise level reaches 92.4 dBA, exceeding the maximum permitted level by an average of 12 dBATaking into account the above, the working conditions of the main groups of workers in the aluminum shop are characterized as “harmful”, class 3, degree 3 (3.3). This in turn allowed us to determine the reduction in the life expectancy of workers when staying in the conditions of this production. Considering that the class of working conditions of workers was classified as class 3, level 3, the hidden damage to health of the assessment of working conditions according to noxological standards is 12.6 days.
Determination of the reduction in life expectancy during stay in production conditions using the formula: RLEpr = (Dpc + Ds + Di) * (A – E).
We have established that the worker is 45 years old with 20 years of experience in the aluminum shop (working conditions 3.2):
RLEpr = (12.6+8.75+5.1) * (45-20) = 661.25 days (1.8 years) for 20 years of work (given that there are 365 days in a year).

Conclusions:
Thus, the use of the noxology method to calculate potential threats to human life during the production of aluminum profile products once again confirms the need to develop health measures.

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