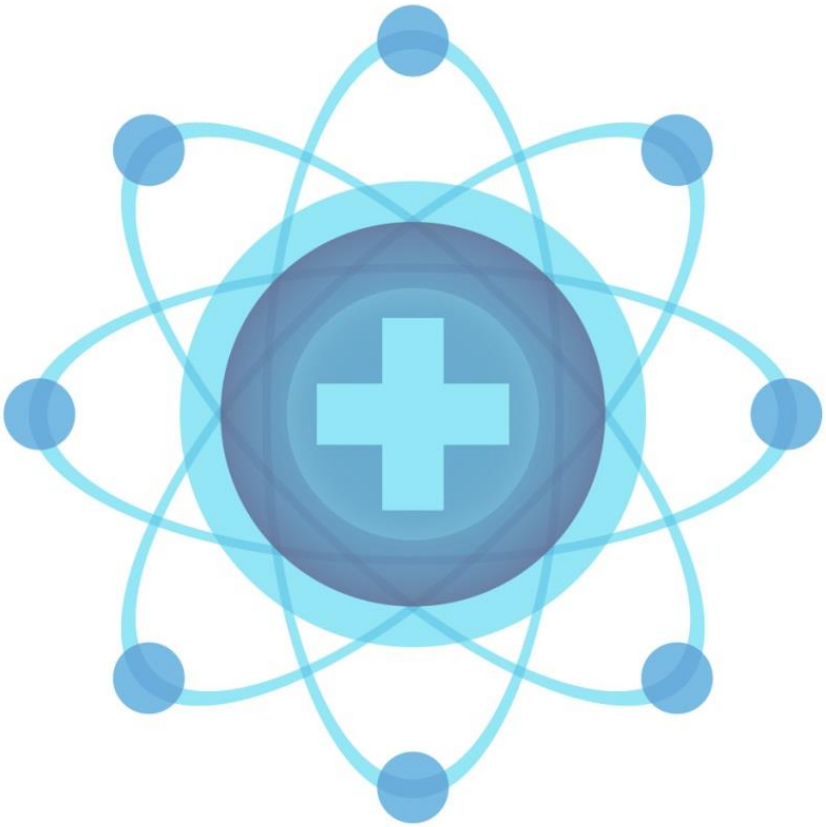

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Hygienic assessment of leading harmful factors in pharmaceutical enterprises

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Abstract. The article discusses the development of science-based preventive measures to identify leading dangerous variables in the main workplaces of pharmaceutical companies' injectable medications production shops, as well as how to mitigate the bad effects of noise and chemical factors on workers' bodies.

Keywords: pharmaceutical companies, injectable medications, technological process, harmful factors, noise, chemical factor, permissible norms, preventive measures.

The relevance of the topic. Scientific and technological advancements, as well as socioeconomic shifts, have resulted in significant changes in workers' working circumstances in a variety of industries, including the pharmaceutical business. Reorganization and the introduction of new technologies and equipment have been carried out and continue to be carried out, taking into consideration recent scientific discoveries and achievements [1, 4]. In addition to the positive aspects, high-efficiency equipment and conveyor lines lead to changes in the working conditions of workers, the formation of various factors that negatively affect their health [2, 5].

On the one hand, the introduction of new techniques and technologies, machines and equipment into the modern production enterprises studied leads to an increase in labor productivity and its facilitation, while on the other hand, it leads to the formation of previously little-studied or unexplored factors of production. However, it persists, even aggravates, and adverse working conditions adversely affect the body of the worker [3, 6, 9].

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It is well known that production conveyors are employed in the manufacture of modern medications, as a result of which workers are exposed to a variety of elements, the most prominent of which are noise and chemical factors in the manufacturing environment [7, 12]. However, the complex effects of these factors have not been sufficiently studied, and only data on operations and processes performed in separate hot climates are available [10]. All of the above once again confirms the relevance of this study.

Aim. Identification of the leading harmful factors in the production of injectable medications of pharmaceutical companies and the development of preventive measures.

Tasks. To achieve this goal, the following should be addressed: Hygienic assessment of noise and chemical factors leading to harmful factors in production and development of health measures to prevent their impact.

Object and method of research.

Research was held in the injection shop of UZKIMYOFARM JSC named after S.K.Islombekov. Commonly used, tested sanitary-hygienic, laboratory-instrumental and statistical methods were used.

The injection molding plant's principal workplaces had their noise levels measured. Sanitary rules and norms No0325-16 “Permissible sanitary norm of noise level in workplaces” [8] analyzed the acquired data [8]. Air dust is determined by the method of gravity, the concentration of dust in the air of the workplace was assessed in accordance with state standard 12.1.005-88 “General sanitary and hygienic requirements for air in the workplace”. The level of gassing was measured and determined by sanitary rules and norms №0294-11 “Permissible Standards of Harmful Substances (Permissible Standard) in Workplace Air”.

The summation coefficient was calculated and the class of working conditions was determined according to sanitary rules and norms No0141-03 "Hygienic classification of the severity and severity of the work process, harmful and hazardous

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working conditions in the production environment," taking into account the formation of several types of chemicals in the production process.

One-way exposure to several harmful substances in the air of workplaces at the same time, the actual amount (K1, K2, ...,), the permissible standard (PS1, PS 2, ... PS n) of each substance in the air should not exceed one.

Calculation of the summation coefficient

$$\frac{К_1}{PS_1} + \frac{К_2}{PS_2} + \frac{К_3}{PS_3} + \frac{К_4}{PS_4} \leq 1$$

The results obtained. After tablets, the preparation of injectable medications in ampoules is the second most popular product [11].

The injection shop of UZKIMYOFARM JSC named after S.K. Islambekov employs 132 people, 97 of whom are women. Ampoules are used to produce liquid and powder pharmaceuticals in this business. Dissolving the beginning components, filtering the solutions, preparing the ampoules, preparing them for collection (washing and other procedures), filling, sealing, sterilization, and labeling are all part of the technological process.

Workers from 17 different professional groups operate at the injection plant. The chemical factor is one of the most harmful things here. The chemical component outperformed permissible standard in the workplaces of four different groups (shop technologist, master, ampoule filler, and ampoule welder) (Table 1).

Table 1

Assessment of chemical factors in the air of the workplace of the injection molding shop of a pharmaceutical company

№	Occupational groups	The average amount of chemical factors								Class of working conditions
		Benzene (class 2)		Nitrogen dioxide (class 3)		Carbon monoxide (class 4)		Ammonia (class 4)		
		Obtained result	REM мг/м^3	Obtained result	REM мг/м^3	Obtained result	REM мг/м^3	Obtained result	REM мг/м^3	
1.	Production engineer	5,2	5,0	2,0	2,0	-	-	19,6	20,0	2

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2.	Master	5,2	5,0	2,2	2,0	-	-	21,3	20,0	3.1
3.	**Ampule filler**	-	-	4,8	5,0	19,8	20,0	-	-	2
4.	Ampoule welder	-	-	1,89	2,0	17,2	20,0	-	-	2

The results showed that in the workplace of production engineer benzene was 0.2 times higher than permissible standard, in the workplace of master benzene and nitrogen dioxide was 0.2 times higher than permissible standard and ammonia was found to be 1.3 times higher than permissible standard. Although the chemicals in the ampoule filling and ampoule welding workplaces did not exceed permissible standard, the study found that the summation coefficient of the chemical factors was higher than ≤1.

Noise is another harmful component that is one of the physical aspects. Mechanical origin, high frequency in terms of frequency composition, broad spectrum in terms of spectral features, and steady in terms of noise time - stable and constant noise levels measured per unit of time - are all characteristics of noise in many workplaces, according to studies.

The following results were obtained when measured the noise level in the workplaces of workers of the main professional group operating in the injectable medications production shop (Table 2).

Table 2

Results of noise assessment in the workplace of the injection shop of a pharmaceutical company

№	Occupational groups	Noise volume, average equivalent level of sound, dBA		Class of working conditions
		Obtained results	RED	
1.	Production engineer	84	80	3.1
2.	Master	81	80	3.1

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3.	Ampoule filler	82	80	3.1
4.	Ampoule welder	81	80	3.1
5.	Plumber-repairman	81	80	3.1
6.	Sterile solution maker	84	80	3.1
7.	Chemical water purifier	82	80	3.1
8.	Ampoule and dish washer	83	80	3.1
9.	Production room cleaner	82	80	3.1

The acceptable level of noise during work for 17 groups of workers in the main occupational group was assumed to be 80 dBA based on the preceding data. During the inspection, it was found that the noise level in the workplaces did not exceed 80 dBA in the workplaces of sterilizers of materials and medications, packers, cutters of tubes and ampoules, repair and commissioning of gas appliances, medical product inspector, auxiliary worker, ampoule controller with injection solution and shop manager. Therefore, it was determined that the working conditions of the workers in this group corresponded to the permitted 2nd class. The noise level in the workplace of production engineer, master, ampoule filler, ampoule welder, plumber-repairman, sterile solution maker, dry cleaner, ampoule and dish washer, production room cleaner increased by 80 dBA. Therefore, the working conditions was classified as 3rd harmful 1st class (Table 2).

Conclusions.

Based on the results of a study conducted in the Injection Molding Shop of JSC “UZKIMYOFARM” named after S.K.Islombekov, the following conclusions were developed:

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1. It was found that in the production engineer and master workplaces of the Shop the chemical factor is higher than permissible standard.

2. It was found that the summation coefficient of chemical factors is higher than <1.0 in all workplaces and this leads to an early manifestation of production fatigue.

3. It was found in the Shop that noise levels are higher than Permissible Degree in the workplaces of production engineer, master, ampoule filler and ampoule welder, plumber - repairman, sterile solution maker, dry cleaner, ampoule and dish washer, and production rooms cleaner.

4. The study of leading harmful factors allowed to determine the class of harmfulness and hazard according to sanitary rules and norms 0141-03. It was found that the Shop production engineer, which fills ampoules and seals ampoules, belongs to the 2nd permissible class, and the master workplace to the 3rd harmful 1st class. The results from the noise measurement showed that the main workplaces above Permissible Degree were classified as 3rd harmful 1st class.

Proposals.

1. In improving the working conditions in the injection shop of the pharmaceutical company the main focus should be the improvement of technology and equipment.

2. To reduce dust and gassing of workplace air, it is necessary to ensure continuous operation and control of the efficiency of the existing ventilation system in production rooms, if necessary, once a year prophylactic inspection and maintenance is required.

3. In order to reduce the noise intensity of noise-generating devices, noise protection enclosures and noise-absorbing devices should be installed. In addition, it is advisable to acoustically treat the walls and ceilings of rooms where such a source is located.

4. It is necessary to rationalize work and rest to prevent fatigue.

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5. Workers should be fully equipped with modern personal protective equipment.

6. According to the Order No. 200 of the Ministry of Health of the Republic of Uzbekistan (dated 29.08.2012), before commencement with the work, initial medical examinations and periodic medical examinations should be carried out in full.

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