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ANALYSIS OF REASONS, CIRCUMSTANCES AND CONSEQUENCES OF MANUFACTURING TRAUMATISM DURING PRODUCTION OF MAIN PHARMACEUTICAL PRODUCTS AND PHARMACEUTICAL PREPARATIONS**АНАЛІЗ ПРИЧИН, ОБСТАВИН ТА НАСЛІДКІВ ВИРОБНИЧОГО ТРАВМАТИЗМУ ПРИ ВИРОБНИЦТВІ ОСНОВНИХ ФАРМАЦЕВТИЧНИХ ПРОДУКТІВ І ФАРМАЦЕВТИЧНИХ ПРЕПАРАТІВ****Yevtushenko O.V. / Євтушенко О.В.***c.t.s., as.prof. / к.т.н., доц.*

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Abstract. In the article there is analyzed statistics on the causes, consequences and circumstances of occupational injuries at the pharmaceutical products and pharmaceuticals for the period from 2013 to 2018, and is found that organizational factors lead to 80% of industrial injuries. The results of the study of the accident are presented in distribution by profession, age, general work experience, and experience in the specialty of the victims. Prophylactic measures are proposed to prevent occupational injuries in the production of basic pharmaceutical products and pharmaceuticals.

Keywords: *injury, cause, event, accident, occupational safety, risk, labor protection.*

Introduction. The statistical study of the causes, consequences and circumstances of occupational injury at the industry of basic pharmaceutical products and pharmaceuticals is a theoretical basis for the formation of a set of effective measures to prevent accidents and reduce its level [1]. This will make it possible to determine directions and recommendations for creating safe working conditions for industry personnel at regional and industrial levels of management of occupational safety. The statistical analysis shows the quantitative side of the processes of trauma in the inextricable connection with their qualitative side. This is an urgent scientific task, first of all, connected with the solution of social problems.

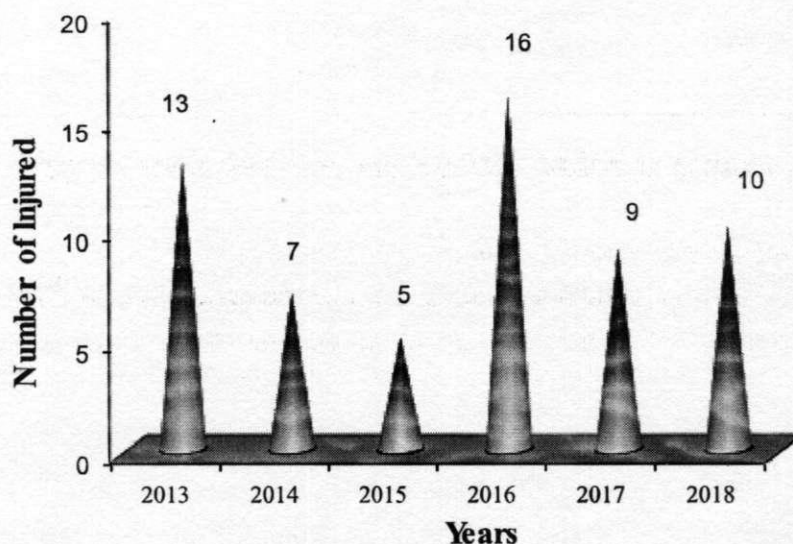
Applied statistical analysis of data on accidents occurring at the industry of basic pharmaceutical products and pharmaceuticals for the period from 2013 to 2018 was applied during the study [2-3]; principal component method. The work up of trends in the time series of industrial injuries is based on data from the State Statistics Service of Ukraine.

Therefore, the purpose of this work is to analyze the causes, consequences and circumstances of occupational injuries at the industry of basic pharmaceutical products and pharmaceuticals for the period from 2013 to 2018.

The main text. According to the results of the statistical analysis, 60 workers were injured at the production of basic pharmaceutical products and pharmaceuticals from 2013 to 2018 (img. 1) [2-3]. The analysis of statistics shows that 63.3% of

injuries were received by men. Women are 36.7%, which is almost 2 times less than the level of injuries for men.

The most common organizational reasons were: violation of traffic safety rules; non-compliance with the requirements of the safety instructions; violation of safety requirements during operation of equipment, machines, mechanisms; failure to perform official duties, lack of proper control by officials.



Img. 1. Distribution of the number of accidents at the production of basic pharmaceutical products and pharmaceuticals, 2013 - 2018

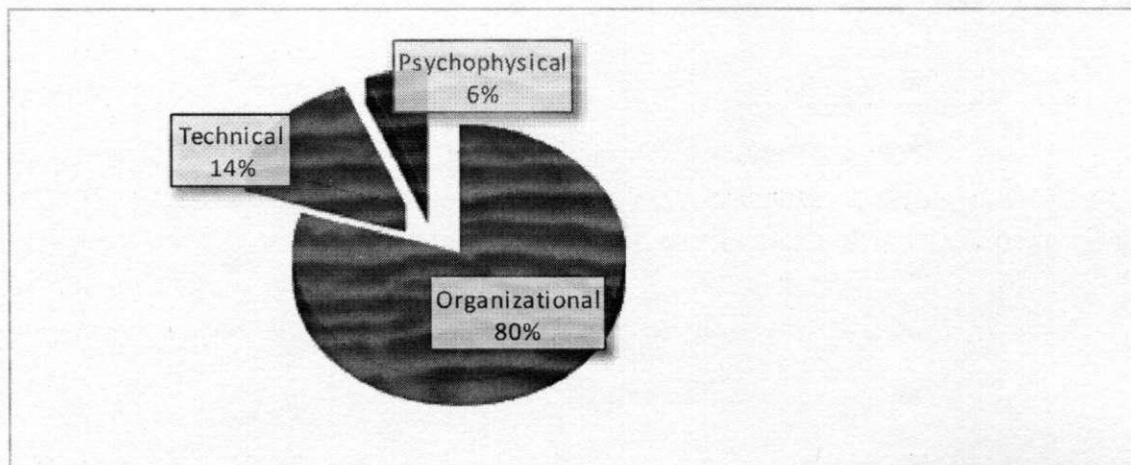
The analysis of statistics shows that for the types of events leading to accidents at the production of basic pharmaceutical products and pharmaceuticals, road accidents are common both on public roads and on the territory of the enterprise; the action of objects and parts that move, fly, rotate; the fall of the victim, including from a height. Among the technical reasons, the following are dominant: design defects, imperfections, insufficient reliability of means of production, vehicles; poor technical condition of industry facilities, buildings, structures, utilities, territory. The most common psycho-physiological reasons were: alcohol-related trauma and personal negligence of the victim (Img. 2) [1].

In addition, a survey was conducted among employees at pharmaceutical enterprises, which showed that for the workers the most common causes of occupational injury are monotonous work, bad mood, fatigue, conflicts in the family and between colleagues, inattentive attitude of managers to workers, poor psychological climate.

According to the analysis of the industrial injury survey for the period 2013-2018, it was found that about 55% of accidents at the production of basic pharmaceutical products and pharmaceuticals are related to the operation of equipment, machinery, mechanisms, vehicles.

The influence of various factors on the indicators of occupational injuries was analyzed: general work experience, experience by specialty, profession, age of the

victims. According to the results of the study, the most traumatic professions in the production of basic pharmaceutical products and pharmaceuticals drivers are most often injured, both from their own fault and from the fault of a third party. The next professional group is workers who operate and maintain equipment. More than half of accidents happen involving electricians, locksmiths, welders, and low-skilled workers are due to failure to comply with the requirements of the safety instructions.



Img. 2. Distribution of the number of victims of occupational injuries by major causes at the production of basic pharmaceutical products and pharmaceuticals, 2013 - 2018.

Of particular concern is the fact that more than half of all accidents occur to workers aged 30 to 50 years. Most employees in this age range have managed to change several professions in different businesses, over-confident and overestimating their own capabilities, which reduce attention and neglect safety rules during the technological process, which eventually creates an emergency. Most of the injuries occur to experienced workers with more than 20 years of work experience and to workers with 1–5 years of professional experience. Both categories are characterized by an extremely negative risk factor with hyperbolization of their own experience in dealing with standard situations. Particular attention should be paid to these facts when conducting initial and repeated on-the-job training. In addition, it is necessary to improve the quality of the trainings themselves, to strengthen the control over the work of employees with little professional experience.

Fatal accidents have been separately analyzed. According to the results of the statistical analysis, 11 workers were killed at the production of basic pharmaceutical products and pharmaceuticals from 2013 to 2018 (Img. 3) [2-3]. 81.8% of fatal injuries happened to male victims. Women's percent is 18.2%, which is 4.5 times less than the death rate for men. As a rule, each injury is caused by several reasons. Among the main are the violations of labor and industrial discipline, violations of safety requirements during the operation of equipment, machinery, mechanisms, violations of traffic rules, failure to comply with the requirements of occupational safety, deficiency during safe work practices training, non-use of available personal protective equipment.

For this reason, in order to prevent occupational injuries and to increase the level of production safety at the production of basic pharmaceutical products and pharmaceuticals, employers should first of all: strengthen control over the compliance with traffic rules by employees whose work is related to the transportation of pharmaceutical products; improve the quality of training and development of safety instructions; improve the effectiveness of training and assessment of occupational safety knowledge of workers, including those employed in high-risk jobs; provide monitoring of production equipment, control systems, production process management, alarms and communications; control both employees and managers of structural units with the requirements of legislative and regulatory acts on labor protection.

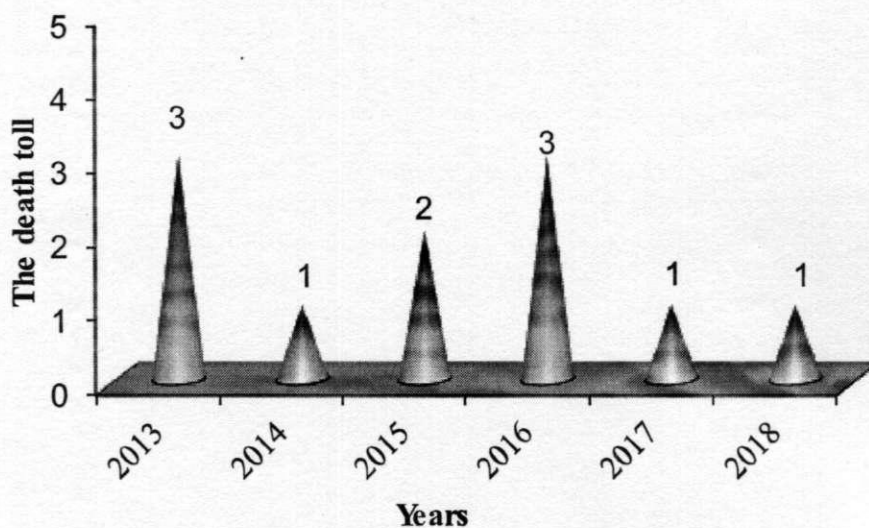


Fig. 3. Distribution of the number of fatal accidents at the production of basic pharmaceutical products and pharmaceuticals, 2013 - 2018

Therefore, for the constant control and monitoring of the state of occupational safety, it is necessary to implement modern information and analytical systems of occupational safety management, which should be organized taking into account the clear interaction of the head of the service (department) of occupational safety with the heads of all structural divisions of the enterprise, for adequate and permanent management taking into account all the factors affecting the state of occupational safety and provide the heads of structural units with an optimal set of measures to ensure occupational safety [4-5].

Conclusion. The analysis of the state of occupational injuries at the production of basic pharmaceutical products and pharmaceuticals showed that for the period 2013- 2018, 60 workers were injured, 11 of them were killed. The study found that organizational factors lead to 80% of industrial injuries. About 55% of accidents are related to the operation of equipment, mechanisms, machinery, vehicles. More than half of all accidents occur to workers of 30 to 50 years of age. A large proportion of occupational injuries happens to experienced workers with more than 20 years of

experience and those with 1–5 years of professional experience. Particular attention should be paid to these facts when conducting initial and repeated on-the-job training. In addition, it is necessary to improve the quality of the trainings themselves, to strengthen the control over the work of employees with little professional experience. It is necessary to increase the responsibility of managers of all levels in the enterprises of the branch in order to prevent them from violating the labor protection legislation, which lead to accidents.

The results of the research can serve as a theoretical basis for the construction of a mathematical model of optimal planning of occupational health and safety measures in food production in order to significantly reduce the level of occupational injuries.

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Анотація. В статті проаналізовано статистичні дані щодо причин, наслідків та обставин виробничого травматизму при виробництві основних фармацевтичних продуктів і фармацевтичних препаратів за період з 2013 по 2018 роки. Під час проведення дослідження застосовано прикладний статистичний аналіз даних про нещасні випадки, метод головних

компонент. Було проведено дослідження трендів часових рядів виробничого травматизму, що базується на даних Державної служби статистики України. Наведено результати дослідження розподілу нещасних випадків за професією, віком, загальним стажем роботи, стажем за спеціальністю потерпілих. Запропоновано профілактичні заходи щодо запобігання виробничого травматизму при виробництві основних фармацевтичних продуктів і фармацевтичних препаратів.

Key words: травматизм, причина, подія, нещасний випадок, безпека праці, ризик, охорона праці.

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