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PROFESSIONAL RISK INDUSTRY FACTORS

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Summary

The hygienic estimation of the main workplace conditions at the tobacco production is presented in this article. The process of tobacco production is divided into two important stages: preparation of tobacco and the production of cigarettes. The first stage occurs in the tobacco department and second ones takes place in the cigarette department. The tobacco department workers are exposed to elevated concentration of tobacco dust 6,5 mg/m^3 (maximum permissible concentration (MPC) 3,0 mg/m^3), noise level is 82-83 dBA that more maximum permissible limit (MPL 80 dBA) for 8 hours working period and adverse microclimate. During eight hours the cigarette department workers are exposed to high noise level 82-83 dBA, the same as previous stage, but concentration of tobacco dust is not higher than MPC.

By results of the estimation of working conditions at the tobacco factory among the basic harmful and dangerous production factors are the tobacco dust, industrial noise, adverse microclimate, severity and intensity of work.

Key words: occupational risk factors, tobacco dust, industrial noise.

ПРОФЕСІЙНІ ФАКТОРИ РИЗИКУ В УМОВАХ ВИРОБНИЦТВА

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Резюме

У статті наведена гігієнічна характеристика умов праці робітників основних цехів виготовлення тютюнових виробів. Процес виробництва сигарет вміщує два важливих етапи: підготовки тютюну і власне виробництво цигарок та сигарет. Перший етап відбувається у тютюновому цеху, а другий – у цигарково-сигаретному. Визначено, що робітники тютюнового цеха працюють в умовах тривалого впливу підвищених концентрацій тютюнового пилу 6,5 мг/м^3, що перевищує ГДК на 3,5 мг/м^3, підвищеного рівня шуму – 82-83 дБА (вище за ГДР на 2-3дБА) та несприятливих мікрокліматичних умовах. Щодо цигарково-сигаретного цеху, то його працівники, протягом 8 годин, піддаються впливу тютюнового пилу (концентрація у межах ГДК), дії підвищеного рівня шуму (вище за ГДР на 2-3дБА).

За результатами оцінки умов праці на тютюновій фабриці серед основних шкідливих і небезпечних виробничих факторів виробництва є тютюновий пил, промисловий шум, несприятливий мікроклімат, важкість і інтенсивність праці.

Ключові слова: професійні фактори ризику, тютюновий пил, виробничий шум.

ПРОФЕССИОНАЛЬНЫЕ ФАКТОРЫ РИСКА В УСЛОВИЯХ ПРОИЗВОДСТВА

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Резюме

В статье дана гигиеническая характеристика рабочих мест основных цехов производства табачных изделий. Процесс производства сигарет включает два важных

этапа: подготовка табака и собственное производство папирос и сигарет. Первый этап происходит в табачном цехе, а второй – в папиросо-сигаретном. Установлено, что рабочие табачного цеха работают в условиях длительного воздействия повышенных концентраций табачной пыли 6,5 мг/м^3, которая превышает ПДК в 3,5мг/м^3, повышенного уровня шума - 82-83 дБА (ПДУ 80 дБА), неблагоприятных микроклиматических условий. В папиросо-сигаретном цехе в течение трудового дня на рабочих воздействует табачная пыль (концентрация в пределах ПДК), производственный шум 82-83 дБА (ПДУ 80 дБА).

По результатам оценки условий труда на табачной фабрике среди основных вредных и опасных производственных факторов является табачная пыль, промышленный шум, неблагоприятный микроклимат, тяжесть и интенсивность труда.

Ключевые слова: профессиональные факторы риска, табачная пыль, производственный шум.

Introduction. The modern tobacco production is an important part of the food industry in Ukraine. During the last years, the material and technical basis has been renewed, production cycles have been modernized by innovative technologies implementation. This process allows increasing the volume and competitive of tobacco products [2].

Most work environments consist of a lot of physical and chemical agents that are potentially hazardous to health. Work conditions are determined as harmful factors which may adversely affect on health of workers in the tobacco production. Among these risk factors are noted such factors as tobacco dust, noise and adverse microclimate. It is known that occupational diseases may be caused by the tobacco dust and high level of noise [7; 8].

The occupational diseases are serious medical, social and economic problems [5; 6]. The air of the work area may include substances which have a combined influence on the tobacco workers.

Approximately four thousand different substances are included into composition of tobacco dust and more than three hundred of them are biological poisons. They present a danger to the human body. Among these potent substances exist nicotine, dibutyl phthalate, vinyl acetate, acetone, sulfuric acid and hydrochloric acid, methyl alcohol, ammonia and others. Hazardous substances of air workplace have different mechanisms of action. In addition to the general action of some hazardous substances are carcinogenic, immunotoxic, allergens and teratogens [10]. There are different pathways of penetration into the human organism. Exposure to chemicals can be through inhalation, ingestion or absorption through

the skin and mucous membranes [7; 8; 9; 10]. However, the main pathway is the inhalation ones through a respiratory tract [1; 12]. Health disorders among tobacco workers have been described by several authors, as a result of hazardous work-related factors impact to tobacco workers [9; 11]. Hygienic characteristics of tobacco workplace conditions were published in some articles in the 70-90-ies of the 20th century, when a lot of the manufacturing operations and the equipments did not match to safety requirements [3, 4]. The outdated hygiene reglamentation and identify of occupational hazards that is not adequate to modern requirements of occupational medicine were described in the spectrum of reports published.

The modernization of tobacco industry has completely been done and the organizational and legal forms for ensuring work safety have been changed for last twenty years. However, in the literature, there are no published studies of workplace hygienic characteristics at the tobacco factories. There are the limited number of reports on occupational illness among tobacco workers. While the hazards of habitual tobacco usage are well established very little information is available about the effects of tobacco dust exposure. Therefore the hygienic analysis of occupational risk factors is important done among various professional groups of the tobacco workers. These factors impact to formation of occupational illness among different professional groups of tobacco workers.

The purpose of the study is a comprehensive hygienic analysis of occupational risk factors. These factors may affect on the health of tobacco factory workers.

Materials and methods. The process of production cigarettes was details being researched. The main professional groups were presented by operators, machinists, transporters, engineers and others. The map workplace conditions of main professional groups has been studied. The map work conditions is a document summarizes the results of certification of workplaces. During the certification of workplaces all produce factors has completely been estimated for determining the hazardous ones. Hygienic estimation characterizes include such tobacco produce factors as tobacco dust, noise, microclimate conditions, variability and mode of work processes, availability and compliance remedies to modern requirements of the process.

The general assessment of work conditions was given with the combined effects of work factors according to “Hygienic classification due to the degree of hazard and risk factors and the severity and intensity of the work process (HN 3.3.5-3.3.8; 6.6.1-083-2001)”.

Results and discussion. Nowadays the most operations are automated, machines carried out by operators and engineers at the modern tobacco production. The technological process is divided by two consecutive stages: preparation of tobacco and its own cigarette

production. During the first stage tobacco mass has been obtained by processing tobacco leaves in a tobacco department. This process is characterized by the most tobacco dust creation. In addition, the release of essential oils and aromatic substances have been increased while the tobacco mass is being moistened and aromatized.

Tobacco mass has been used for producing of cigarettes. During the humidification and aromatization of tobacco mass is accompanied by an increased release of essential oils and aromatic substances. This produce stage occurs automatically, except one manual operation which presented by loading raw material into a special bunker. The main professions at the tobacco factory are casing cuisine operator, tobacco ripping operator, tobacco grader, tobacco processing line operator, tobacco leaf cutting machine operator, tobacco processing machine operator. There are three periods during a working process and each of them is eight hours duration.

Mean temperature is about 26,4±1,48°C (normal level 18°C), humidity is 56,96 ± 4,64% (according to requirements humidity should be maintained at 70%) and the air flow rate is 0,2 m/s (the normal values 0,5 m/s) in tobacco department.

Tobacco dust concentration is 6,5 mg/m^3 also the concentrations of following tobacco dust components are nicotine – 6,2 mg/m^3, acetaldehyde – 5,8 mg/m^3, vinyl acetate – 9,8 mg/m^3, methylcellosolve – 1,5 mg/m^3, methanol – 6,7 mg/m^3 and ammonia – 18 mg/m^3. The maximum permissible concentration (MPC) tobacco dust and nicotine in the workplace air is 3 mg/m^3 , MPC for acetaldehyde is 5 mg/m^3, vinyl acetate is 10 mg/m^3 , methanol is 5 mg/m^3 and ammonia is 20 mg/m^3 according to "Hygienic classification due to the degree of hazard and risk factors and the severity and intensity of the work process (HN 3.3.5-3.3.8; 6.6.1-083-2001)".

The noise exposure levels are ranged between 82 – 83 dBA, that higher than MPL (80 dBA). Classes of conditions according to the degree of severity work process for tobacco processing line operators, tobacco ripping operator, tobacco grader and industrial premises cleaners are 3.2 degree, tobacco processing machine operators and transporters are 3.1 degree. Although row materials have been delivered by electric cars, but boxes have been loaded by hand to pallets. During each hour the total weight of cargo has been transported up to 68 kilograms.

Thus, tobacco workers are protractedly exposed by high concentrations of tobacco dust in the workplace (higher 3,5 mg/m^3 than MPC), high noise level (2-3 dBA more than MPL) and temperature that is higher on 8,0- 8,4 ° C than permissible one.

Cigarettes are produced on the processing lines, which include filter producing, cigarette and packaging machines. The high degree of leak tightness and automation of process have been ensured by construction of the modern production lines and the producing and releasing of dust at this stage - is minimal. The cigarette producing department is the main stage of tobacco production process, where 50% employees work. The temperature of air is within the range from 22 to 25 ° C air velocity ranges from 0,1 to 0,2 m/s and the humidity is from 50% to 60% in the cigarette producing department that is conformed to the norm requirements. Although, a tobacco dust concentration is until 3 mg/m3 that complies with requirements, but equipment generates wideband noise which higher than the maximum permissible level by 2-3 dBA. Thus, all employees are exposed by increased noise level in the cigarette department.

The tobacco processing line operator is 30% from all professions at the tobacco factory.

Classes of conditions according to the degree of severity work process for processing line operator, operate of cigarette making machine, operate of machine for making filters are 3.1 degree. Classes of conditions of packaging machine operator is 3.1 degree, because the most of work time laborers have to stay in an uncomfortable working posture.

To ensure the proper functioning of primary production at the plant has a number of additional services, the employees of which have their own premises, but up to 50% of the time can be carried out in the main shops. These include quality control of finished products and services engineering, performing repairs and commissioning of equipment, as well as storage and delivery service. Total class work environment engineering support workers (plumbers, repairmen, electricians for maintenance of electrical equipment, welders of manual welding, etc.) and quality of service, taking into account the impact of the entire complex of harmful and dangerous factors of 3.2. Workers finished goods warehouses total class working conditions - 2.

For organizational and technological unfavorable factors of professional activity should include shift work regime, forced to work the night shift, high intensity labor process with strained monotonous movements, a significant number of served mobile machinery, physiologically unfavorable working position (mostly standing), constant exposure to noise, tobacco dust , a severe need for the presence in the workplace.

Tobacco manufacturing workers are provided with personal protective equipment Hearing - "earplugs" Respiratory - Respirator "petal-210", "Khibiny", helmets, clothing, footwear, rubber gloves. The company has carried out preventive fortification workers

exposed to tobacco dust. Every day, give 2 mg of vitamin B1 and 150 mg of ascorbic acid. After work, the workers necessarily take a shower, clothes subjected to dust removal.

Thus, in spite of the active modernization of production processes in the manufacture of tobacco on the body of work influenced by a complex of unfavorable factors, among which is dominated by long-term exposure to tobacco dust and its components, exceeding the MPC by 3 mg / m3 in the tobacco shop, the presence of constantly high noise level, which is More GDR by 2-3 dBA, significant static load. Therefore, the tobacco company needed: comprehensive mechanization using a remote process and operations management; sealing production equipment, which is the source separation of tobacco dust, gas, water, heat, rational organization of work and rest to prevent monotony and physical inactivity, as well as labor constraints of gravity.

Of greatest interest and concern is the evidence of a synergistic effect from combined exposures to tobacco dust components and noise, a factor that has not really been taken into consideration in industry previously and one that is not clearly recognised and understood. This fact can be explained that at present the industries where tobacco dust and noise are hazards are extremely reluctant to participate in research studies for fear of litigation. Much work needs to be done to persuade companies to take part in open research which will benefit their workers and their practices in the long-term.

It is important therefore to examine the interaction effects of tobacco dust components and noise on workers exposed to noise and chemicals together and each.

Conclusions. According to above we can made the following conclusions:

1. The dominant occupational risk factors are the tobacco dust and the noise in the modern tobacco factory. The tobacco dust concentration has not been been exceed the MAC in the most workplaces (up to 3 mg/m^3), except the tobacco department, where tobacco dust concentration has been increased in twice times.

The noise level has been exceed above 2-3 dBA the maximum permissible limit for 8 hours. The severity and intensity of the work process of majority profeessins correspond to class 2-3.1.

2. To adverse organizational and technological professional activities of the tobacco factory workers should be included the high intensity work process with stressful monotonous movenments, a significant number of served mobile machinery, physiologically adverse working posture (mostly standing) strictly necessary presence in the workplace, a shift work.

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