EXCELLENCIA
INTERNATIONAL MULTI-DISCIPLINARY JOURNAL OF EDUCATION

Volume 01, Issue 05, 2023 ISSN (E): 2994-9521

Diagnosis and Prevention of Occupational Diseases Caused By Exposure to Industrial Dust

Kamalova M.Sh.
Lecturer at the Department of Occupational Safety and Health Engineering at Samarkand University of Architecture and Civil Engineering.
E-mail: Nafisakamalova5@gmail.com Tel.: (+99891 554-17-37)

Abstract:

This article discusses the diagnosis, prevention and medical and social examination of occupational diseases (pneumoconiosis, siderosis, anthracosis and silicosis).

Worldwide, 270 million accidents and 160 million occupational diseases are recorded annually. Every year, about two million workers become disabled and die as a result of occupational diseases.

Introduction

We are talking about one of the most common types of occupational diseases – **pneumoconiosis** and **silicosis**. The term silicosis was first proposed by the Italian anatomist Visconti in 1870. It is used to this day to designate a peculiar, mostly nodular, fibrosis of the lungs from inhalation of silica dust - free silicon dioxide (SiO2). And also the concept of pneumoconiosis was introduced even earlier, in 1866, by Zenker to designate pulmonary fibrosis that develops as a result of inhalation of various types of dust.

In industry, transport and agriculture, a significant number of works and operations are accompanied by the formation and release of industrial dust. Dust has a harmful effect mainly on the upper respiratory tract and lungs. With prolonged exposure to dust, serious damage to the entire body is possible, primarily occupational bronchitis and pneumoconiosis. Depending on the type of dust that caused the development of pneumoconiosis, the corresponding types of pneumoconiosis are distinguished. Silicosis is called pneumoconiosis caused by exposure to silicon dioxide, silicosis - exposure to dust of various silicates (in particular, kaolin - kaolinosis, talc - talcosis, asbestos - asbestosis, etc.), anthracosis - coal, siderosis - iron-containing dust, etc. Mixed forms of pneumoconiosis are designated taking into account the composition of the dust, for example, silicoanthracosis, silicosiderosis, etc. The combination of pneumoconiosis with

pulmonary tuberculosis is designated as coniotuberculosis; at the same time, depending on the type of dust, the terms “silicotuberculosis”, “anthracotuberculosis”, etc. are used. [3]

Silicosis can develop in foundry workers, sandblasters, during the repair of glass furnaces, and in the production of quartz glass. Pneumoconiosis occurs among electric welders, sharpeners, grinders, construction workers (from exposure to asbestos dust, cement, dry clay), in the chemical industry, in the production of building materials, etc. [2]

Industrial dust is classified according to the method of its formation, origin, particle size (dispersity). The harmful effects of industrial dust on the health of workers depend on many factors. These primarily include the chemical properties of dust, electrical charge, dust solubility, shape of dust particles, dispersion, and dust content in the air. The dust content in the air should not exceed the maximum permissible concentration (MAC) established by GOST 12.1.005-88 “General sanitary and hygienic requirements for work area air.”

Ultramicroscopic particles with a size of 0.25 - 0.1 microns hover in the air for a long time. The most dangerous in terms of the occurrence of occupational diseases are dust particles less than 5 microns in size (and especially 1 – 2 microns). Less dangerous are ultramicroscopic and visible dust. In practical production conditions, particles up to 5 microns in size make up 70–90% of all dust particles, 10 microns and above – 0.6–8%.

The degree of dispersion of dust particles during various processing processes

Table 1

Process	Type of dust	Dust particle size ratio, %			
		up to 2 microns	2 – 5 microns	5 – 10 microns	>10 microns
Metal stripping	Metal and mineral	57	31	9	2
Sharpening	>>	62 – 80	13 - 24	6 – 10	0,6 3,5
Wood turning	Woody	48	20	24	8

Pneumoconiosis caused by inhalation of mixed dust without or with an insignificant content of silicon dioxide includes:

- pneumoconiosis of electric welders and gas cutters;
- pneumoconiosis of sanders;
- pneumoconiosis in workers at rubber industry enterprises from the combined effects of soot, talc and other components of the rubber mixture, etc.

In the process of work associated with electric welding and cutting of metals, a highly dispersed aerosol is formed, including dust of iron and other metals, as well as gases with toxic and irritating properties, and silicon dioxide, which leads to the formation of pneumoconiosis in electric welders and gas cutters.

The composition and amount of highly dispersed dust formed depends on the type of welding, the composition of the welding materials used and the metals being welded, the welding process mode, etc. In addition to iron dust, and in some cases free silicon dioxide, welding aerosol may contain toxic substances - manganese oxides, chromium oxides, compounds of nickel, copper, zinc, vanadium and other metals, as well as nitrogen oxides, carbon monoxide, ozone, fluoride hydrogen, etc. The concentration of these substances in the air can reach quite high values, especially if electric welding

is carried out in closed containers (cisterns, tanks, etc.) When cutting metals, acetylene, propane-butane, pyrolysis, coke oven and city gases, and kerosene vapor are used as fuel. Steels of various grades are subjected to cutting, which may contain, in addition to iron, alloying elements (manganese, chromium, nickel, cobalt, copper, beryllium, etc.). During the gas cutting process, a highly dispersed aerosol, the content of which can exceed the maximum permissible concentration many times, also enters the worker's breathing zone. The highly dispersed aerosol of complex composition generated during electric welding and gas cutting of metals can have fibrogenic, toxic, irritating, and sensitizing effects.

In this regard, electric welders and gas cutters, in addition to pneumoconiosis, may experience other occupational diseases: chronic bronchitis, bronchial asthma (from exposure to chromium, nickel and other compounds), manganese intoxication. It is possible to develop acute lesions of the upper respiratory tract and lungs, up to toxic pulmonary edema (hydrogen fluoride, nitrogen oxides, etc.), as well as "foundry fever" - from exposure to condensation aerosols of zinc, copper, nickel and other metals. Gas cutters who have contact with irritating and toxic gases are also prone to repeated pneumonia and frequent acute respiratory diseases.

Among the etiological factors of pneumoconiosis in electric welders and gas cutters, dust of iron oxides, other metals (manganese, aluminum, etc.), as well as silicon dioxide, should be taken into account. There are known cases of manganoconiosis in electric welders who use high-quality manganese-containing electrodes. If the welding aerosol contains a large amount of dust of iron oxides and silicon dioxide, then pneumoconiosis of electric welders is regarded as siderosilicosis.

Clinical manifestations of pneumoconiosis in electric welders and gas cutters, like many pneumoconiosis, are very scarce. Typically, patients complain of a cough with a small amount of sputum, chest pain and moderate shortness of breath with physical exertion. During the study, in a number of cases, signs of moderately severe pulmonary emphysema and scant catarrhal phenomena in the form of a few dry wheezing and (or) noise from pleural friction (mainly in the inferolateral parts of the lungs) are determined. X-ray examination reveals diffuse enhancement and deformation of the vascular-bronchial pattern in the initial stage of pneumoconiosis. Against this background, clearly defined, round, nodule-like formations of the same shape and size are identified, which, as the disease progresses and with continued work under conditions of exposure to aerosol, fairly evenly dot both lung fields. These changes are caused mainly by the accumulation of radiopaque particles of metal dust. The X-ray picture resembles that of the nodular form of silicosis, but unlike it, with pneumoconiosis in electric welders and gas cutters, as a rule, there is no fusion of nodule-like formations in the lungs, and there is no significant enlargement of the lymph nodes of the roots of the lungs. The morphological substrate of this pneumoconiosis, in contrast to silicosis, is radiopaque dust of iron and other metals. Pneumofibrosis is weakly expressed; fibrous nodules characteristic of silicosis does not form.

Pneumoconiosis of electric welders and gas cutters, as a rule, is characterized by a benign course without progression of the process in the post-dust period. Its distinctive feature is the possibility of regression or reverse development of the pathological process after stopping work in contact with dust. Regression of X-ray morphological changes in the lungs is observed in 5–24% of patients.

Additional contraindications for employment in contact with industrial dust include total dystrophic and allergic diseases of the upper respiratory tract; chronic diseases of the bronchopulmonary system; deviated nasal septum, preventing nasal breathing; chronic, often

recurrent skin diseases; allergic diseases when working with allergenic aerosols; congenital anomalies (malformations) of the respiratory and heart organs. [4]

Treatment of pneumoconiosis

In the treatment of pneumoconiosis, the emphasis is on etiological (cessation of contact with dust) and pathogenetic treatment. Pathogenetic treatment includes the use of agents: improving the drainage function of the bronchi (expectorants, sputum thinners); reducing pressure in the pulmonary circulation and cardiac activity (selectively improving blood flow in the heart muscle, metabolites of the heart muscle, reducing the need for oxygen in the heart muscle; antihypoxants, antioxidants, in cases of heart failure - cardiac glycosides. Vitamin therapy (group of vitamins B, vitamin C), biogenic stimulants (vitreous body, peloid distillate, placenta extract, prodigisone, humisol, etc.), adaptogens (eleutherococcus, Chinese schisandra, ginseng, pantocrine, apilac, etc.) are also used. Ultraviolet irradiation, UHF, diathermy on the chest, vibration massage of the chest, breathing exercises, physical therapy.

In complicated cases of pneumoconiosis with activation of specific microflora - tuberculostatic drugs; when nonspecific microflora is activated - antibiotics and sulfonamide drugs; in the presence of asthma attacks - sympathomimetics, anticholinergic drugs, methylxanthines; for spontaneous pneumothorax - drainage of the pleural cavity. [3]

Prevention of pneumoconiosis is based on improving technological processes (sealing, mechanization, technology, moving control panels outside the work premises, air humidification, etc.); high-quality conduct of preliminary preventive medical examinations upon admission to work and periodic medical examinations during the work process (according to Order of the Ministry of Health of the Republic of Uzbekistan No. 2387 dated August 29, 2012 “On the procedure for conducting preliminary and periodic medical examinations of workers”), the main purpose of which is to determine the professional suitability for work in contact with dust.[1]

Regular use of personal protective equipment is important in the prevention of pneumoconiosis: dust respirators, safety glasses, special dust-proof clothing; it is necessary to have in good condition and regularly use collective protective equipment: local supply and exhaust ventilation and humidification of processed materials.

It is necessary to improve the health of persons who have contact with dust in a dispensary, a boarding house, regularly use paid breaks in addition to lunch to visit the inhaler, and regular additional meals.

References

1. Приказ Министерства Здравоохранения РУз №2387 от 29 августа 2012 г. «О порядке проведения предварительных и периодических медицинских осмотров работников».
2. Шамсидиновна, К. М., & Мамарасулович, А. А. Психическое состояние человека, определяющее безопасность труда, и методы его улучшения. Европейский журнал безопасности и стабильности жизнедеятельности (2660-9630), 260-262. (2022).
3. Yasakov Z. X., Achilov A M., Kamalova M. Sh. ISHLAB CHIQARISHDA FAOLIYAT XAVFSIZLIGI VA MEHNAT MUHOFAZASINI TASHKIL ETISH. SYNERGY: JOURNL OF ETHICS AND GOVERNANCE (Volume: 02 Issue: 06 | 2022 ISSN: 2181-2616), 19-21.
4. Профессиональные болезни. Руководство для врачей / Под ред. Н.Ф. Измерова. М.: Медицина, 1996. Т. 1, 2.
5. Van Damm P., Tormans G. European risk model // Proceeding of International //Congress on Hepatitis B as an Occupational Hazard. Vienna, 1993.