Xenobiotics as a Risk Factor for Kidney and Urinary Diseases in Children and Adolescents in Modern Conditions

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ABSTRACT

The study of the state of health of children and adolescents under the influence of the environment is the leading direction of modern hygienic research.This is caused, on the one hand, by the increasing anthropogenic impact on nature and the associated deterioration of the ecological situation, on the other hand, by the emergence of a complex of new, mainly technogenic environmental factors - xenobiotics that can have a significant effect on humans, especially in the early stages of development of body systems. The most sensitive to the effects of both negative and positive environmental factors are children and adolescents. The organs of the genitourinary system are among the most vulnerable in relation not only to endogenous factors, but also to exogenous ones, due to the fact that most toxic substances are excreted through the kidneys.

Keywords: health, risk factors, xenobiotics, diseases of the kidneys and urinary system.

Introduction: With prolonged exposure to relatively small concentrations of substances (acids, oxides, solvents, salts of heavy metals, etc.), nephropathy develops, the frequency of diseases of the urinary system increases [1,4,8,9,10,11,20]. According to the literature, the cause of chronic renal failure in 19% of patients is unknown, which suggests a certain role in its development of various xenobiotics [4,11]. Occurrence and progression of econephropathies is due not only to the direct effects of xenobiotics, but also to the development of hypersensitivity to them. With a prolonged intake of xenobiotics that are not subjected to metabolic transformations in the body, conditions are created for their accumulation. With an increase in the concentration of xenobiotics and the time of their exposure, the adaptive systems of the body begin to work with great overload. There is a breakdown in the mechanisms of adaptation and the basis for the occurrence of the disease is created [1,4,10,11,12,19,20]. Numerous studies have revealed a high risk of the formation of nephropathies and anomalies of the urinary system in children living in regions contaminated with salts of heavy metals [1,4,8,9,10,11,20]. Epidemiological data were confirmed by experimental studies showing that the intoxication of experimental animals is severe metals and their salts (mercury, lead, lead acetate) lead to kidney damage of varying severity [4,5,21,22]. It is possible to mediate the effect of chemicals on the kidneys through the immune system, an imbalance of the central and autonomic nervous system, the activation of lipid peroxidation processes and effects on membranes, enzymes, gene structures [4,5,22]. The results of epidemiological and clinical data are the most reliable source of information on the influence of environmental risk factors in the development of kidney disease

Objective: To study the effects of xenobiotic emissions of ammophos production on kidney and urinary tract diseases of children and adolescents, as well as to develop a set of health and preventive measures in the area of exposure to the chemical plant.

Material and research methods: The main object of observations and research were healthy organized children and adolescents in 2 districts of the city, located at different distances from the chemical plant of mineral fertilizers. The first group is children and adolescents living in an industrial area, directly in the sanitary zone, and a distance of 3 km from the chemical plant; the second group is children and adolescents living in the administrative district of the city at a distance of 25-30 km from the specified enterprise. In-depth medical examinations of preschoolers and schoolchildren were carried out. Medical examination was carried out by doctors of the medical team and 6-year students of the pediatric faculty of SamSMU. Of all the examined children, 1940 belonged to the I and II health groups (921-control). Of these, 639 preschoolers, the remaining 1301 were schoolchildren. The main attention was paid to the study of chronic morbidity of the organs of the genitourinary system, the circulatory system, organs respiration i.e. those systems that are more likely to suffer when exposed to chemical contaminants. Evaluation of the organs of the genitourinary system was carried out on the basis of complaints, laboratory studies of urine, circulatory organs were carried out according to the heart rate, the level of systolic, diastolic and pulse blood pressure, and the state of the respiratory system - according to the vital capacity of the lungs- respiratory rate - data obtained directly during the examination.

Results: The prevalence of chronic diseases in children and adolescents of all ages is greater in the industrial area than in the control area.However, this difference is more often expressed in the chronic incidence of the upper respiratory tract, digestive system, kidneys and urinary tract. nof the cardiovascular system of preschoolers: the average values of the pulse rate in preschoolers in the industrial area (A) differs from the corresponding data of children from the control area (B). Accordingly: the data in the age groups from 3 to 6 years in the "A" region is 6.1-7.7 beats per minute more than in the "B" area (p <0.001). With age, this indicator decreases slightly. The decrease in heart rate by 5-6 years indicates optimization and improving the function of the cardiovascular system in all children. This pattern is observed in schoolchildren of industrial and control areas. The heart rate (6.0-8.0 beats per minute) in schoolchildren of the industrial district was lower than in children of the control district (p <0.001). The majority of children and adolescents in industrial (79.8%) and non-industrial (89.3%) districts had normal pulse rates of M $\pm$ I G_R in all ages. The magnitude of the pulse within M$\underline{C}$ 2 G_R and above was considered as a decrease and increase, that is, a violation of the function of the cardiovascular system (10.0% ; 3.6 in the "B" region) (p <0.05). Spirometry data in the industrial area for the entire age by an average of 60-96 mm^3 were lower than in children of the control area (p <0.05). In schoolchildren of an industrial area, with increasing age, the increase in vital capacity of the lungs is uneven, as well as in children and adolescents in the control area. This indicator in the industrial area was 36-116 mm3 less. Than in the control groups (p <0.001). The observed changes in children living in an industrial area occur due to the prolonged action of atmospheric pollution and due to the constant shallow breathing of children, which is a protective reaction to respiration of toxic substances-xenobiotics. As you know, the compensatory protective reaction to a decrease in vital capacity of the lungs is tachycardia Indicator morbidity in the industrial area according to the in-depth medical examination is 1.9 times higher than in the control environment of pathology chronic tonsillitis100.2 (48.5), diseases of internal secretion, eating disorders101.2 (48.5), kidney and urinary tract diseases 106.5 (51.5). Prevalence of kidney and urinary tract diseases in an industrial area per 1000 children M 37.6, m $\pm$ 0.64, in the control area M 14,6, m+0,42. (p <0.01). In the industrial area 2.6 times more than in the control area.

Conclusion: Consequently, in children of the industrial area, in contrast to the children of the control area, kidney and urinary tract diseases are much more common, there are some deviations in the functional state of the cardiorespiratory system, which are manifested

by vegetative-vascular lability (reduction and increase in heart rate), an increase and decrease in pressure, hypotension and tachycardia, a decrease in vital capacity, lungs and a delayed reaction of adaptation of the cardiovascular system, which is that is associated with exposure to toxic factors-xenobiotics of chemical production.

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