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Ecology and Congenital Malformations

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***Abstract*---**The article highlights the environmental conditions in small industrial cities of the republic, identifies the main sources of atmospheric air pollution. To study the influence of the environmental factor on the frequency of the prevalence of IDP, data on the "hygienic assessment of environmental pollution" of the State Department of Statistics of the Republic of Uzbekistan were analyzed, the degrees of atmospheric air pollution of the studied region were estimated by the total impact of hygienic factors on the health of the population.

***Keywords*---**congenital malformations, production factors, hygienic assessment, environmental pollution.

Introduction

The habitat is a complex factor contributing to the emergence of various pathological processes and diseases in humans. At the same time, the complex of environmental factors is extremely diverse, has territorial features, is determined by the presence of active and potentially dangerous agents that can either independently or in complex interaction

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with other factors cause dysembriogenesis and ultimately contribute to the growth of the indicators of general and specific frequencies of congenital malformations in children in high-risk territories (Seydinov et al., 2015).

In the conditions of the current unfavorable environmental situation both in the world and in Uzbekistan, the interest of medical science and practice is increasing not only in the general morbidity in general, but also in congenital malformations of children. In the last decade, the birth rate with congenital malformations in the Republic of Uzbekistan (RUz) has been increasing and remains a problematic task of pediatrics (Seydinov et al., 2015). In order to preserve a healthy generation, special attention is required to study the factors affecting the occurrence of congenital malformations and their prevalence in children. The researchers emphasize that, perhaps due to the rapid development of industry and, consequently, the increase in the release of toxic substances and their impact on human health, congenital pathology is registered.

3 times more often, and this is only over the last 100 years (Musakhodjaeva et al., 2019). This forecast is also confirmed by the fact that annually for every 100 thousand of the population, the birth rate of children with a congenital anomaly increases by 1.38 times (Fomenko et al., 2018). WHO provides world statistics on the frequency of birth of children with congenital anomalies per 1000 newborns, and this is 0.6-1.6 cases (Hong & Baek, 2017; Inoyatov & Rahmatov, 2020).

A considerable place among the causes of infant mortality in the republic, along with respiratory diseases, infectious diseases and others, is also occupied by congenital anomalies of development. At the same time, the perinatal mortality rate in the republic ranges from 10.9 to 12.2 per 1000 births (Mardanov et al., 2017).

Moreover, the direct causes of perinatal mortality in various regions are: asphyxia and atelectasis (47.2-50.0%), birth injuries (17.0-20.0%), congenital developmental defects (12.8-14.0%). The causes of the development of congenital pathology and mortality from it are a number of factors, one of which is environmental pollution, especially in industrial cities, but these issues have not been sufficiently studied (Jalilova et al., 2021). In this regard, the study of the prevalence of congenital pathology and the factors influencing its occurrence is an urgent problem.

Materials and Methods

Based on this, the aim of the study was: to study the socio-hygienic factors affecting the prevalence of congenital pathology in children in small industrial cities of Uzbekistan, and to improve measures aimed at their prevention. To

achieve which, the following tasks were solved: to study the frequency of prevalence and structure of congenital pathology in children living in small industrial cities of Uzbekistan; study and evaluation of socio-hygienic factors affecting the occurrence and prevalence of congenital anomalies; development of ways to improve measures to prevent congenital pathology in children.

Materials and methods of research

Our studies on the prevalence of congenital malformations were conducted in small industrial cities of the Tashkent region - Angren, Almalyk and Akhangaran, located in the north-east of the Republic of Uzbekistan. These cities were chosen due to the presence of a large number of industrial enterprises and harmful substances released into the environment, which can be the causes of various deviations in the development of children.

The city of Almalyk is a large industrial center, where ore dressing enterprises and a mining and metallurgical combine are operating, producing copper and lead smelting. Almalyk Chemical Plant produces sulfuric acid using non-ferrous metallurgy waste and a large assortment of fertilizers and pesticides. Industrial emissions into the atmosphere consist of sulfur dioxide and carbon monoxide.

The city of Angren is located in the region of the brown coal deposit. The Angren Chemical and Metallurgical Plant, open and closed coal mines operate in this region, Angren thermal power plant, rubber products factory. Industrial emissions into the atmosphere consist of sulfur dioxide, nitrogen, hydrocarbons, etc.

In the city of Akhangaran there is a cement plant, a slate plant, a reinforced concrete products plant, a «Stroyplastmass» enterprise, a «Santehmet» plant, etc. Industrial emissions into the atmosphere consist of hydrocarbons, nitrogen, etc. Thus, all three cities are cities with high environmental pollution by various industrial emissions that affect the health of the population, in particular mothers and children.

In order to solve the tasks we have used various methods: sociological, anamnestic and statistical, the method of extrapolation of data based on dynamic series. When collecting and developing the material, the "International Statistical Classification of Diseases and Health-related problems 10-revision" was used. In order to study the influence of the environmental factor on the frequency of the prevalence of CVD, we analyzed data on the "hygienic assessment of environmental pollution" of the State Department of Statistics of the Republic of Uzbekistan.

Results and Discussions

According to the study, the rate of children born with anomalies per 1000 live births in 2018-2019 was 12.2, there is a cyclical course of the prevalence of HPV, which is associated with a number of socio-hygienic factors. The air pollution of settlements is directly dependent on the concentration of industrial facilities, the specifics of their production, the geographical location of a particular area, the

intensity of traffic and other factors that determine the duration of the circulation of polluting components.

It has been established that the main pollutants of atmospheric air in the studied small industrial cities of Uzbekistan are sulfur dioxide, ammonia vapors and hydrogen fluoride, the content of which exceeds the MPC by 1.5-4 times. There was also ammophos dust in the emissions of the plants, the concentration of which exceeded the permissible limits by 4-5 times. The annual pollution of atmospheric air by emissions of amophos production is 62 thousand 536 tons, of which up to 6 thousand 430 tons are not captured. The main sources of release of these substances into the atmosphere are the drum granulator of drying, collectors, air coolers, a high-speed ammonizer, a warehouse of raw materials and finished products, as well as a system of labor pipelines.

The largest amount of emissions from stationary sources falls on Almalyk (about 150 thousand tons), where large enterprises of non-ferrous metallurgy and chemical industry are located, on Angren (about 80 thousand tons) - enterprises of the Ministry of Energy, Building Materials, Petrochemicals and others. Accordingly, in these cities, the birth rate of children with various congenital pathologies is 18.6 and 10.2, respectively, per 1,000 children born alive. The main sources of atmospheric pollution in Almalyk are a mining and metallurgical plant, whose emissions account for 95% of stationary sources, a household chemicals plant, a thermal power plant, cable, automobile transport, production association "Ammophos", Almalyk plant of building materials, furniture factory, in the city of Angren there are enterprises of the coal mining industry, enterprises of the association AZDR, "Uzbekrezinotekhnika", SURP, "Angrenenergotsvetmet", GRES, boiler house, automobile transport and in the city of Akhangaran are Novoangrenskaya GRES, Akhangarantsement production association, Stroyplastmass plant, reinforced concrete. During the hygienic assessment of environmental pollution in Almalyk, according to the existing sources of atmospheric air pollution, it was established:

- Assessment of public health indicators – the degree of danger to public health "dangerous";
- Assessment of atmospheric air indicators – the level of pollution is "moderate", the degree of danger is "alarming".

According to the total hygienic assessment, the degree of environmental pollution of Almalyk is attributed to the "zone of a tense ecological situation". During the hygienic assessment of environmental pollution in the city of Angren , it was established:

- Assessment of public health indicators – the degree of danger to public health "causing concern";
- Assessment of atmospheric air indicators – the level of pollution is "strong", the degree of danger is "dangerous".

According to the total hygienic assessment, the degree of environmental pollution of the city of Angren is attributed to the "zone of a tense ecological situation".

During the hygienic assessment of environmental pollution in the city of Akhangaran, it was established:

- Assessment of public health indicators – the degree of danger to public health "causing concern";
- Assessment of atmospheric air indicators – the level of pollution is "moderate", the degree of danger is "alarming".

According to the total hygienic assessment, the degree of environmental pollution in Akhangaran is attributed to the "zone of a tense ecological situation". Thus, according to the total impact of hygienic factors on the health of the population, all three industrial districts are classified as a zone of a tense ecological situation and cause concerns for the health of the population.

To confirm the influence of the environmental factor on the level of prevalence of VPR, we selected the control Bostanlyk district of the Tashkent region, where, according to the State Department of Statistics, the level of sulfur dioxide, nitrogen oxide, carbon monoxide and dust in the air does not exceed the MPC. During the hygienic assessment of environmental pollution in the Bostanlyk district, it was established:

- Assessment of public health indicators – the degree of danger to public health "not causing concern";
- Assessment of atmospheric air indicators – the level of pollution is "low", the degree of danger is "not causing concern".

According to the total hygienic assessment, the degree of environmental pollution of the Bostanlyk district is classified as a "zone of relatively favorable environmental situation". Our research has shown that in all the cities studied by us, gas pollution, dustiness of atmospheric air, the presence of harmful substances were noted. Noise at work undoubtedly affects the health of the population, including women and children, their birth with congenital malformations.

Analysis of the presented data showed that the prevalence of HPV tends to increase ($P < 0.05$). In the Bostanlyk district, the prevalence of HPV is at a relatively equal level, and in small industrial cities compared to it, under the influence of environmental factors, there is an increase in the birth of children with HPV by 1.9 times, which is statistically significant. The given digital data confirm that factors of production and environmental pollution contribute to an increase in the prevalence of HPV in small industrial cities.

The high concentration of harmful substances in production and in the environment in these cities is one of the causes of somatic and gynecological diseases among women, especially of fertile age, which in turn is often the cause of the birth of children with HPV. When analyzing the social status of parents who had children with congenital pathology, it was revealed that the majority of women (41.23+2.4%) were housewives at the time of the survey; 32.7+2.28% were employees and 23.46+2.06% were workers. But when we conducted a detailed

survey among housewives, it turned out that most of them, both before and during pregnancy, worked in industries with harmful working conditions.

The influence of harmful factors on the mother's body, especially during pregnancy, also contributes to the high frequency of birth of children with congenital pathology. At the same time, it is noted that the influence of noise and vibration most often leads to CR and deformation of the musculoskeletal system (50.0+2.43%) and CR of the digestive organs (15.63+1.76%). The influence of chemicals most often leads to CPR and deformation of the musculoskeletal system (29.17+2.21%); CHD and CPR of the nervous system (14.58+1.71% each); CPR of the digestive organs (12.5+1.61% each).

The combined effect of occupational hazards on the body of a pregnant woman led to the birth of children with various malformations, of which CHD was the most common (29.87+2.22%); VPR and deformities of the musculoskeletal system (20.78+1.97%); cleft lip and palate (10.39+1.48%). All this proves the selective effect of harmful factors on the body of a woman and fetus.

The analysis of the birth of children with various pathologies, depending on the length of work in hazardous industries, showed that the highest percentage of the birth of children with anomalies is observed with the mother's work experience of 6 years or more (19.91+1.94%); with experience of 4-6 years – 20.38+ 1.96%; with experience of 2-4 years - 10.43+ 1.49% and with work experience up to 2 years - 5.92+ 1.15%. In our opinion, this is due to the adaptive and adaptive function of the body, that the occurrence of various pathologies in children is observed even in cases where the impact took place a year before birth.

The influence of harmful factors on the father's body also has an effect on the frequency of birth of children with congenital pathology. At the same time, it is noted that the influence of noise and vibration on the father's body most often leads to VPRS and VPR of the nervous system (25.93+2.13% each); cleft lip and palate, as well as VPR and deformities of the musculoskeletal system (18.52+1.89% each). The influence of chemicals most often leads to CPR and deformation of the musculoskeletal system (22.58+2.03%); CHD (19.35+1.92%); cleft lips and palate (17.74+1.86%); VPR of the nervous system (12.9+1.63%). The combined effect of occupational hazards on the father's body most often contributed to the birth of children with various malformations, of which the most common were CR and deformities of the musculoskeletal system (23.53+2.06%); CHD (22.06+2.01%).

The analysis of the birth of children with pathology, depending on the length of work of the father in conditions of harmful production, showed that the highest percentage of the birth of children with pathology is observed with the father's work experience of 6 years or more (49.53+2.43%); with 4-6 years of experience - 25.59+2.12%; with 2-4 years of experience - 16.35+ 1.8% and with work experience up to 2 years - 2.84+0.81%.

For a more visual representation of the impact of occupational hazards, we carried out a correlation analysis between the birth of children with HPV and the impact of occupational hazards. Thus, out of the surveyed 422 families, in

23.46% of cases, the mother, and in 64.5% of cases, the father worked at enterprises with harmful effects of various factors (Table 1).

Table 1
Correlation between the length of work of the mother in conditions of harmful production and the frequency of occurrence of VPR

№	Work experience in years	The birth of children with VPR, %	X	Y	d (x-y)	d^2
1	Up to 2 years	5,92	1	1	0	0
2	2-4 years	10,43	2	2	0	0
3	4-6 years	20,38	3	4	-1	1
4	More than 6 years	19,91	4	3	1	1
						Σ= 2

$$\rho = 1 - 6 \Sigma d^2 / n (n^2 - 1)$$

$$\rho = 1 - 6 \times 2 / 4 \times (16 - 1) = 1 - 12 / 60 = 1 - 0,2 = + 0,8$$

As can be seen from the table, if the mother works under these conditions, there is a strong direct correlation (r = +0.8). Moreover, the greatest dependence was noted when a chemical factor was exposed to a woman's body. These data once again confirm that harmful factors of production are one of the leading causes of children's congenital pathology.

Among the most important tasks facing the health authorities in terms of improving the health of the child population is to reduce the frequency of birth of children with congenital malformations. Therefore, it is of great importance to predict the risk of having children with congenital malformations. We calculated normalized intensive indicators and risk factors for the birth of children with congenital pathology by using the Shigan technique (Table 2).

Table 2
Normalized intensive risk indicators for the occurrence of VPR

№	Factor	Gradations	information	NPC	R	X
1	Mother's age	Up to 20 years	13,27	13,27	73,3	972,7
		20-30 years	69,67	69,67		5106,8
		30-40 years	16,11	16,11		1180,9
		40 and more	0,95	0,95		69,0
2	Father's age	Up to 30 years	58,53	58,53	22,4	1311,1
		30-40 years	34,12	34,12		764,3
		40 and more	2,61	2,61		58,5
3	Mother's nationality	Uzbek	65,64	65,64	4,6	301,9
		Russian	14,22	14,22		65,4
		Another nation	20,14	20,14		92,6
4	Nationality of the father	Uzbek	65,64	65,64	6,6	433,2
		Russian	9,95	9,95		65,7

		Another nation	19,67	19,67		129,8
5	Social status of the mother	Employee	32,7	32,7	15,8	516,7
		Working	23,46	23,46		370,7
		Housewife	41,23	41,23		651,4
		Student	2,61	2,61		41,2
6	Nationality of the father	Working	32,7	32,7	64,4	2105,9
		Housewife	61,14	61,14		3937,4
		Student	0,95	0,95		61,2
7	Experience in this profession of the mother	Up to 2 years	5,92	5,92	3,4	20,1
		2-4 years	19,91	19,91		67,7
		4-6 years	10,43	10,43		35,5
		6 and more	20,38	20,38		69,3
8	Experience in this profession of the father	Up to 2 years	2,84	2,84	17,4	49,4
		2-4 years	25,59	25,59		445,3
		4-6 years	16,35	16,35		284,5
		6 and more	49,53	49,53		861,8
9	Occupational hazards (mothers)	Noise and vibration	5,45	5,45	7,65	41,7
		Chemical substances and dust	13,98	13,98		106,9
		Combined	9,0	9,0		68,9
		Psychoemotional	41,71	41,71		319,1
		No	29,86	29,86		228,4
10	Occupational hazards (father)	Noise and vibration	13,98	13,98	4,03	56,3
		Chemical substances and dust	26,07	26,07		105,1
		Combined	34,36	34,36		138,5
		Psychoemotional	8,53	8,53		34,4
		No	12,32	12,32		49,6
11	Diseases and complications of pregnancy	Anemia	17,54	17,54	241,9	4242,9
		Gestosis	16,59	16,59		4013,1
		Nephropathy	0,24	0,24		58,1
		The threat of miscarriage	0,47	0,47		113,7
		No complications	58,06	58,06		14044,7
		Anemia and gestosis	6,87	6,87		1661,9
		Anemia and threat	0,24	0,24		58,1
12	Bad habits of the father	Smoking	48,82	48,82	22,9	1117,9
		Alcohol	2,84	2,84		65,0
		Drug addiction	2,13	2,13		48,8
		Smoking and alcohol	8,29	8,29		189,8

		No	33,18	33,18		759,8
13	Bad habits of the mother	Smoking	12,3	12,3		88,6
		Alcohol	23,5	23,5	7,2	169,2
		Drug addiction	7,8	7,8		56,2
		Smoking and alcohol	56,4	56,4		406,1

To determine the risk of having a child with a congenital pathology, it is necessary to add up the values of influencing factors and leading risk factors for the birth of children with various congenital pathologies according to Table No. 2, and then compare the result with the risk sub-ranges (Table 3).

Table 3
Sub-ranges of probabilistic prognosis of the birth of children with congenital pathology

Sub - ranges	Sub-band size	Forecast Group
the smallest	551,4-9336,7	the lowest probability of congenital pathology
average	9336,8-18956,4	controversial forecast
the largest	18956,5-28293,1	the greatest probability of the occurrence of congenital pathology
The whole range 551,4-28293,1		

The developed prognostic tables can be used to predict the probability of the birth of children with congenital pathology, which is a very important condition for the optimal choice of treatment and rehabilitation measures

Conclusion

High pollution of the environment, especially atmospheric air, leads to the fact that in cities where industrial production is developed, residents from generation to generation are constantly exposed to the influence of a controversial forecast of small concentrations of harmful substances, and this in turn is one of the factors causing a high incidence of the population, including children with various pathologies.

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