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# MODERN PROBLEMS OF ATMOSPHERIC AIR POLLUTION ON THE EXAMPLE OF A LARGE INDUSTRIAL CITY OF TASHKENT

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**Abstract:** The article reflects the monitoring indicators of the ambient air quality in Tashkent and gives a hygienic assessment of the data obtained. Based on the data obtained, practical recommendations aimed at preventing atmospheric air pollution were developed.

**Keywords:** air pollution, hygienic assessment, industrial city.

**The relevance** of this study is determined by the extreme importance of atmospheric air, the role of which is difficult to overestimate. The well-known aphorism “I breathe - it means I live” contains the life-determining significance of air. Clean atmospheric air is the key to human health. Polluted atmospheric air is a risk factor for the development of many cardiorespiratory diseases in children and adults [1, 2, 3].

The vast majority of sources of air pollution (sulfur dioxide, carbon monoxide, nitrogen oxides and solid particles formed during industrial and other human activities) are anthropogenic: enterprises of the fuel and energy complex, transport, mechanical engineering, industry and agriculture, etc. [4, 5]. The concentration of these particular air pollutants is recorded in the range of values exceeding the maximum permissible standards.

In the Republic of Uzbekistan, the level of air pollution remains high. This is evidenced by official data, explaining the negative situation by a significant increase in the number of motor vehicles against the background of a certain decline in industrial production [5]. The monitoring system created in the Republic of Uzbekistan allows for continuous monitoring of the state of the environment, identification of unfavorable factors and areas of their occurrence, and implementation of preventive work and long-term forecasting.

**The purpose** of this study was to conduct a hygienic assessment of the air quality in Tashkent in 2018.

**Materials and methods.** In pursuance of the Resolution of the Cabinet of Ministers "On improving the environmental monitoring system in the Republic of Uzbekistan" (No. 737 dated September 5, 2019), comprehensive work was carried out in the following areas:

- The Center for Hydrometeorological Service (Uzhydromet) organized continuous monitoring of the state of atmospheric air in a total of 25 cities of Uzbekistan at 53 functioning stationary observation points [6];
- 5 main pollutants (dust, sulfur dioxide, carbon monoxide, nitrogen dioxide and nitrogen oxide) were continuously studied and, if necessary, the parameters of compliance of ammonia, phenol, formaldehyde, ozone, chlorine, solid fluorides, hydrogen fluoride, heavy metals with established standards were additionally studied;

- the monitoring of the state of the atmospheric air included a program for measuring and statistically processing average values for the year, maximum one-time values and their compliance with maximum permissible concentrations (MPC) for each pollutant.

This retrospective study for 2018 was devoted to the study of modern problems of air pollution using the example of a large industrial city of Tashkent.

The capital of Uzbekistan - the city of Tashkent - is the largest industrial, administrative-territorial and cultural center in the republic with a population of more than 4 million people. There are 3 airports, large road and railway transport hubs on the territory of Tashkent. The city is located on the right bank of the Chirchik River in the foothills of the Western Tien Shan. The relief in the western part of Tashkent is predominantly flat, in the eastern - moderately hilly.

The continental-subtropical climate of the city is a contributing factor to the likely high air pollution. The air basin of the city of Tashkent is polluted mainly due to TashGRES, motor transport, thermal power plants and household boiler houses.

**Results of the study.** In Tashkent, air quality monitoring was conducted at 13 stationary posts of Uzhydromet.

An integrated indicator reflecting the level of air pollution is the air pollution index (API). This indicator was calculated for 5 main air pollutants (dust, sulfur dioxide, carbon monoxide, nitrogen dioxide and nitrogen oxide), Table 1.

**Table 1. Air pollution levels (API)**

| № | Air Pollution Levels | Values of the IPA |
|---|---|---|
| 1 | Reduced | less than 5 points |
| 2 | Low | 0-4 points |
| 3 | Increased | 5-6 points |
| 4 | High | 7-13 points |
| 5 | Very High | more than 14 points |

Table 2 presents the atmospheric air pollution indicators due to soil and cement dust as a consequence of intensive construction of residential buildings and active automobile traffic. The data obtained indicate that the maximum one-time dust concentration exceeded the MAC by 2.4 times (at post No. 2 in October 2018).

**Table 2. Air pollution indicators with dust**

| № | Indicators | Monitoring results |
|---|---|---|
| 1 | Average annual concentration | 0.1 mg/m3 |
| 2 | Maximum one-time concentration | 1.2 mg/m3 |
| 3 | Air pollution index | 0.96 points |

Table 3 reflects the results of monitoring atmospheric air due to pollution by sulfur dioxide emitted into the atmosphere from power plants, boiler houses and metallurgical enterprises during combustion of fuel containing sulfur, as well as during processing of sulfide ores.

**Table 3. Indicators of atmospheric air pollution by sulfur dioxide**

| № | Indicators | Monitoring results |
|---|---|---|
| 1 | Average annual concentration | 0.03 mg/m3 |
| 2 | Maximum one-time concentration | 0.083 mg/m3 |
| 3 | Air pollution index | 0.06 points |

According to the State Statistics Committee, as of January 1, 2024, the number of passenger cars owned by individuals in the Republic of Uzbekistan amounted to 3,759,045 units (in 2016 - 1,974,182, in 2017 - 2,057,331, in 2018 - 2,133,507). The largest number of car owners is in Tashkent - 597,931 cars.

The indicators of atmospheric air pollution with carbon monoxide are reflected in Table 4 and indicate that the maximum one-time concentration was recorded at post No. 14 in October and amounted to 8 mg / m3 (1.6 MPC m.r.).

**Table 4. Indicators of atmospheric air pollution with carbon monoxide**

| № | Indicators | Monitoring results |
|---|---|---|
| 1 | Average annual concentration | 2.0 mg/m3 |
| 2 | Maximum one-time concentration | 8.0 mg/m3 |
| 3 | Air pollution index | 0.65 points |

A high percentage of excess MPC from the analyzed samples for nitrogen dioxide and nitrogen oxide was noted at all stations in Tashkent. But the maximum MPC value for nitrogen dioxide was recorded at post No. 2 in July 2018 - 0.18 mg / m3 (MPC -2.1), Table 5.

**Table 5. Indicators of atmospheric air pollution with nitrogen dioxide and nitrogen oxide (monitoring results)**

| № | Indicators | Nitrogen dioxide | Nitrogen oxide |
|---|---|---|---|
| 1 | Average annual concentration | 0.04 mg/m3 | 0.02 mg/m3 |
| 2 | Maximum one-time concentration | 0.18 mg/m3 | 0.11 mg/m3 |
| 3 | Air pollution index | 0.97 points | 0.29 points |

At the next stage of the work, we gave a hygienic assessment of the ozone content in the atmospheric air. Under the influence of intense solar radiation, photochemical reactions occur in the atmosphere, resulting in the formation of ozone. The ozone content is determined at station 1 (the Tashkent Observatory meteorological site). The monitoring results are presented in Table 6.

**Table 6. Ozone content in atmospheric air**

| № | Indicators | Monitoring results |
|---|---|---|
| 1 | Average annual concentration | 0.022 mg/m3 |
| 2 | Maximum one-time concentration | 0.149 mg/m3 |
| 3 | Air pollution index | 0.60 points |

The results of the study of the content of specific impurities in the atmospheric air (phenol and ammonia) are presented in Table 7.

**Table 7. Content of phenol and ammonia in the atmospheric air (monitoring results)**

| № | Indicators | Phenol | Ammonia |
|---|---|---|---|
| 1 | Average annual concentration | 0.002 mg/m3 | 0.01 mg/m3 |
| 2 | Maximum one-time concentration | 0.016 mg/m3 | 0.25 mg/m3 |
| 3 | Air pollution index | 0.50 points | 0.23 points |

Table 8 shows the content of hydrogen fluoride and formaldehyde in the atmospheric air. The data obtained indicate that the maximum one-time concentration of hydrogen fluoride exceeded the MAC by 2.4 times and was recorded at post No. 2 in October 2018.

**Table 8. Content of hydrogen fluoride and formaldehyde in the atmospheric air (monitoring results)**

| № | Indicators | Hydrogen fluoride | Formaldehyde |
|---|---|---|---|
| 1 | Average annual concentration | 0.003 mg/m3 | 0.017 mg/m3 |
| 2 | Maximum one-time concentration | 0.021 mg/m3 | 0.059 mg/m3 |
| 3 | Air pollution index | 0.58 points | 9.45 points |

**Discussion.** The monitoring results allowed us to conclude that, in general, the quality of atmospheric air in Tashkent in 2018 could be assessed as satisfactory, corresponding to the established MAC. Certain excesses of indicators related to emissions of nitrogen, sulfur and carbon oxides, dust and smoke were recorded.

**Conclusions.** Installation of modern production equipment, solution of the problem of waste recycling, large-scale planting of deciduous trees and grasses (alfalfa) in all available areas to reduce dust pollution will reduce air pollution.

It is also necessary to introduce a moratorium on new construction until the approval of a comprehensive plan, especially high-rise buildings and point development. It is important to issue construction permits only within the framework of "green" standards.

It is necessary to provide for the creation of free zones from motor vehicles on central streets, to restrict the movement of vehicles of categories No. 2 and No. 3 (carrying capacity, weight over 3.5 and 12 tons) during busy times of the day (from 07:00 to 10:00 and from 17:00 to 20:00), to gradually prohibit the movement of all categories of cars produced before 2010, with the introduction of benefits for the transition to modern transport. It is necessary to develop programs that will allow private organizations to invest in solving environmental problems; to provide the opportunity to provide tax benefits for donations to the environmental sector.

It is necessary to create a working commission under the city khokimiyat with the obligatory participation of representatives of the ministries of ecology, health, transport, construction, in order to develop recommendations for improving air quality.

**References**

1. World Health Organization. Ambient (outdoor) air pollution. Режим доступа: https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health.
2. Salomova F.I., Sadullaeva Kh.A., Mirrakhimova M.Kh., Kobilzhonova Sh.R., Abatova N.P. Environmental pollution and public health. Medical journal of young scientists. 2023; 01(5): 163-166.
3. Sherkuzieva G.F., Salomova F.I., Sadullaeva Kh.A. Sanitary condition of atmospheric air and public health. Problems of biology and medicine. 2022; 4(1): 121-124.
4. Salomova F.I., Sherkuzieva G.F., Salullaeva Kh.A., Sultanov E.Y., Oblokulov A.G. Atmospheric air pollution in the city of Almalyk. Medical journal of young scientists. 2023; (1): 142-146
5. Salomova F., Sadullayeva H., Sherkuzieva G., Yarmuhamedova, N. State of atmospheric air in the republic of Uzbekistan. Central Asian Journal of Medicine. 2020; (1): 131-147.
6. Review of the state of air pollution in the cities of the Republic of Uzbekistan in the territory of Uzhydromet activity for 2018. 2019; (1): 155.
7. Law of the Republic of Uzbekistan "On the sanitary and epidemiological well-being of the population" No. ЗРУ-393 dated 08.26.2015. Access mode: https://lex.uz/docs/2732584
8. Law of the Republic of Uzbekistan "On the Protection of Atmospheric Air" No. 353 of 1996. Access mode:https://lex.uz/docs/58400?ONDATE=15.09.2017

9. SanRandN RUz No 0293-11 "List of MACs of pollutants in the atmospheric air of populated areas of the Republic of Uzbekistan". Access mode: https://nrm.uz/contentf?doc=368639_perechen_predelno_dopustimyh_koncentraciy_(pdk)_zagryaznyayushchih_veshchestv_v_atmosfernom_vozduhe_naselennyh_mest_na_territorii_respubliki_uzbekistan_(gigienicheskie_normativy_sanpin_ruz_n_0293-11)_(utverjdeny_glavnym_gosudarstvennym_sanitarnym_vrachom_ruz_16_05_2011_g_)&products=1_vse_zakonodatelstvo_uzbekistana
10. SanRandN RUz No. 0350-17 "Sanitary norms and rules for the protection of atmospheric air in populated areas of the Republic of Uzbekistan". Access mode: https://ssv.uz/ru/documentation/sanpin-0350-17-sanitarnye-normy-i-pravila-po-ohrane-atmosfernogo-vozduha-naselennyh-mest-respubliki-uzbekistan
11. Саломова, Ф. И., Миррахимова, М. К., & Кобылжонова, С. Р. (2022). Влияние факторов внешней среды на развитие атопического дерматита у детей. In *Серия конференций Европейского журнала научных архивов*.
12. Akhmadalieva, N., Nigmatullaeva, D., Kamilov, A., Hakimova, D., & Salomova, F. (2020). Comparative self-assessment of the teachers' health of higher education institutions of the republic of Uzbekistan. *International Journal of Advanced Science and Technology*, *29*(5), 1353-1355.
13. Саломова, Ф. И. (2009). Функциональное состояние опорно-двигательного аппарата школьников с нарушениями осанки. *Травматология и ортопедия России*, (1), 70-73.
14. Yarmukhamedova, N. F., Matkarimova, D. S., Bakieva, S. K., & Salomova, F. I. (2021). Features of the frequency of distribution of alleles and genotypes of polymorphisms of the gene Tnf-A (G-308a) in patients with rhinosinusitis and the assessment of their role in the development of fhis pathology.
15. Саломова, Ф. И., & Тошматова, Г. О. (2012). Эпидемиология мастопатии и особенности заболеваемости женщин, страдающих мастопатией. *Врач-аспирант*, *52*(3.1), 222-228.
16. Шеркузиева, Г. Ф., Саломова, Ф. И., & Юлдашева, Ф. У. (2023). Результаты санитарно-химических исследований воды.
17. Otajonov, I., Shaykhova, G., Salomova, F., Kurbanova, K., Kurbonov, K., & Malokhat, N. (2020). Effectiveness of diet in experimental chronic kidney disease. *European Journal of Molecular and Clinical Medicine*, *7*(2), 1097-1109.