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ASSESSMENT OF THE LEVEL OF ATMOSPHERIC AIR POLLUTION BY MOTOR VEHICLES THE CONCENTRATION OF CARBON MONOXIDE

I.V. Abdrashitova[1], A.B. Abdrashitova[2], R.M. Safina[2], A.E. Abdrashitov[2].

[1]Kazan (Volga region) Federal University, 18 Kremlevskaya St, Kazan 420008, Russia, [2]Federal State Budgetary Educational Institution of Higher Education Kazan State Medical University of the Ministry of Healthcare of Russia, 49 Butlerov St, Kazan 420012, Russia.

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Annotation:

The atmosphere has an intense impact not only on humans and biota, but also on the hydrosphere, soil and vegetation, geological environment, buildings, structures and other man-made objects. Therefore, the protection of atmospheric air and the ozone layer is the most priority environmental problem and it is paid close attention in all developed countries. the Purpose of the study is to Determine the pollution of the surface layer of the atmosphere in some parts of Kazan by vehicle emissions. Results: the Results of studies and calculations show that the amount of carbon monoxide emissions exceeds the norm from 4-15 times. The risk coefficient on the investigated section of Academician Parin street is "high" (5-7), on the section of Pushkin street the risk coefficient is "extremely high". The current situation of anthropogenic impact has a negative impact on the health of the population living in the area of these parts of the city. Daily contact with a negative atmospheric background increases the risk of diseases such as cardiovascular diseases, respiratory diseases, organ dysfunction, CNS depression, dermatological diseases (dryness, peeling of the skin).

Keywords: *Ecology, environmental pollution, human health.*

Corresponding author:

I.V. Abdrashitova,

Candidate of Pedagogic Science,
Associate Professor of Kazan (Volga region) Federal University,
18 Kremlevskaya St, Kazan 420008, Russia,
E-mail: abdrashitova.irina.docent@mail.ru . ORCID: 0000-0002-8048-4556.

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INTRODUCTION:

The activity of modern humanity is associated with the use of a variety of natural resources, covering a large number of chemical elements. Increased anthropogenic impact on nature has generated a number of environmental problems related to the state of the atmosphere, hydrosphere and lithosphere [1,2].

The atmosphere of the Earth has boundless reserves of air. In addition to the main components (nitrogen, oxygen, carbon dioxide), atmospheric air contains a large number of other elements that are part of the atmosphere, or pollutants. Pollution can be natural (volcanic eruptions, earthquakes, dust storms, forest fires) and anthropogenic (industrial plants, power plants, boilers, rail, road and air transport). Particularly acute is the problem of clean air in urban areas, where its composition is no longer able to self-clean and self-renew [3].

Today, the intensive growth of urban areas has enabled road transport to become the most adverse environmental factor in the formation of human health and the natural environment in the city. Thus, the car becomes a competitor for human living space and the culprit of air pollution - one of the main sources of life on Earth, polluting the air environment with toxic components, causing significant harm to the biosphere [4,5].

2017 is declared the Year of ecology in the Russian Federation and the year Of ecology and public spaces in the Republic of Tatarstan. In this regard, the task of arrangement of natural objects (parks, squares, embankments, etc.) and the creation of high-quality environment throughout the Republic of Tatarstan to allow the population to interact with the natural environment, play sports and take care of their health in the fresh air.

This circumstance determined the situation of air pollution by road transport as a priority, which is relevant for the city of Kazan, so this problem became the theme of the environmental study "Assessment of the level of atmospheric air pollution by vehicle gases on the concentration of carbon monoxide".

Research objective:

To determine the impact on human health pollution of the surface layer of the atmosphere in some areas of Kazan emissions of vehicles.

MATERIAL AND RESEARCH METHODS:

In recent years, the number of vehicles, especially individual car owners, has been steadily increasing in the Republic, resulting in an increase in the negative impact of this mode of transport on the atmospheric air of cities and settlements of the Republic. To study the state of the surface layer of the atmosphere selected 2 sites in Kazan: Pushkin street (section OST. University) and academician Parin street (section OST. Universiade Village). The choice of these sites is due to the fact that these streets are student dormitories of our University and students several times a day are at stops. Observations were made in several repetitions: morning, day, evening. For the calculation of air pollution emissions from vehicles, "Guidelines for the assessment of emissions of pollutants into the atmosphere from mobile sources" were used (Begma, 1984; Shapovalov, 1990). This methodology is designed to estimate vehicle emissions near controlled intersections using calculation methods to improve the environmental situation in Kazan. The statistical analysis was performed using IBM SPSS Statistics 23.

RESULTS:

The atmosphere has an intense impact not only on humans and biota, but also on the hydrosphere, soil and vegetation, geological environment, buildings, structures and other man-made objects. Therefore, the protection of atmospheric air and the ozone layer is the highest priority environmental problem and is given close attention in all developed countries.

We have determined the number of vehicles passing on the road for 1 hour. The results are presented in table 1.

Table 1: *Number of vehicles passing on the road for 1 hour*

Study time	Number of vehicles on site 1		Number of vehicles on site 2	
	automobile	buses	automobile	buses
morning	1800	94	2140	80
lunch	3000	80	2426	120
evening	3600	54	2614	136

The formula for estimating the concentration of carbon monoxide (CSR): CSR = (0.5+0.01 N = K)=Cu =Cs =Ka =KV =KP

Substitute the values of the coefficients, estimate the level of atmospheric air pollution with carbon monoxide:

Data on academician Oparin street: CSR morning = (0.5 + 0.01 x 2220 x 1.1) x 0.4 x 1.06 x 1.05 x 0.85 x 1.8 = 16.97 mg/m3 (MPC increased 3 times). CSR day = (0.5 + 0.01 x 2546 x 1.13) x 0.4 x 1.06 x 1.05 x 0.85 x 1.8 = 19.93 mg/m3 (MPC increased 4 times). CSR evening = (0.5 + 0.01 x 2750 x 1.13) x 0.4 x 1.06 x 1.05 x 0.85 x 1.8 = 21.32 mg/m3 (MPC increased 4 times).

Data on Pushkin street: CSR morning = (0.5 + 0.01 x 1894 x 1.08) x 1.06 x 1.05 x 0.8 x 1.15 x 1.8 =38.62 mg/m3. (MPC was increased to 7 times). CSR day = (0.5 + 0.01 x 3080 x 1.08) x 1.06 x 1.05 x 0.8 x 1.15 x 1.8 =54.11 mg/m3. (MPC increased 11 times). CSR evening = (0.5 + 0.01 x 3694 x 1.08) x 1.06 x 1.05 x 0.8 x 1.15 x 1.8 = 74.45 mg/m3. (MPC increased 15 times).Macmot (maximum allowable concentration maximum one-time) of the motor vehicle emissions of carbon monoxide equal to 5 mg/m3.

The high negative index of the maximum permissible concentration of carbon monoxide led to the need to calculate the hazard coefficient of non-carcinogenic risk of morbidity.

Non-carcinogenic risk is assessed by calculating the hazard coefficient (HQ): HQ=C/RfC where C is the concentration of the substance in atmospheric air, mg/m3, D – oral dose, mg/kg, RfC, – reference (safe) concentration RfD - reference dose.

To assess the total exposure of chemicals, a hazard index is used: HI = HQ1 + HQ2 + ... + HQn, where HQ1, HQ2, HQn are hazard coefficients 1, 2 n – th chemical. According to the results of the calculation of air pollution by exhaust gases of vehicles (carbon monoxide) at the experimental sites, the hazard coefficient of non-carcinogenic risk of morbidity was calculated: HQ1y= 16 and 97 : 3 = 5,6; HQ1д= of 19.93 : 3 = 6,6; HQ1в= one-21.32 : 3 = 7,1; Hq2u= 38.62 : 3 = 12.8; Hq2d= 54,11 : 3 = 18,0; Hq2b= 74.45 : 3 = 24.8.

These indicators indicate a high level of risk to human health. The table 2 shows the values of the coefficient of non-carcinogenic risk.

Table 2: *Assessment of non-carcinogenic risk to public health at site 1 and site 2.*

Study area	**Substance**	**Dose (mg/m3) C**	**Reference concentration RfC, мг/м^3**	**Non-Carcinogenic hazard coefficient risk HQ**	**Target Organs**
Site No. 1, Street Academician Oparin	CO morning	16,97	3	5,6	Blood disease
	CO lunch	19,93	3	6,6	Skin disease
	CO evening	21,32	3	7,1	Central nervous system diseases
Site №2, Pushkin Street	CO morning	38,62	3	12,8	Respiratory system
	CO lunch	54,11	3	18,0	Reproductive system
	CO evening	74,45	3	24,8	Diseases of the cardiovascular system

Таким образом, имея данные о коэффициенте неканцерогенного риска опасности можно определить критерии коэффициента опасности (table 3).

Table 3: *Risk assessment is carried out in accordance with the criteria of the hazard coefficient*

Less than 0.1	The risk is minimal
0,1 - 1	Low risk
1-5	Risk average
5-10	High risk
10 and more	The risk is extremely high

The results of studies and calculations show that the amount of carbon monoxide emissions exceeds the norm from 2-5 times. Risk ratio in the survey area street Academician Oparin "high" (3-4), on the plot of Pushkin street is the coefficient of risk is "extremely high."

CONCLUSIONS:

The current situation of anthropogenic impact has a negative impact on the health of the population living in the area of these parts of the city. Daily contact with a negative atmospheric background increases the risk of diseases such as cardiovascular diseases, respiratory diseases, organ dysfunction, depression of the Central nervous system, dermatological diseases (dryness, peeling of the skin).

We have developed recommendations to improve the environmental condition of the surveyed areas:
Measures for the protection of atmospheric air:

- Improvement and development of road networks;
- Providing access to transport communications, the most important nodes and terminals of the main modes of transport;
- Increase in the share of vehicles operating on liquefied or compressed natural gas, provision of appropriate infrastructure;
- Use of natural gas as the main fuel for thermal power facilities.

To reduce the volume of harmful emissions into the atmosphere of the car uses a list of methods:

1. Continuous improvement of engine models and reduction of vehicle hulls in order to minimize their fuel consumption.
2. The use of environmentally friendly fuels (natural gas, liquid hydrogen, ethyl alcohol and other varieties of "green gasoline").
3. The supply of the exhaust pipes of cars with converters. In developed countries, cars are forbidden to appear on the roads without these "filters" for cleaning exhaust gases.
4. Introduction of automated systems of traffic control with the aim of reducing the time of operation of automobile engines in idle and acceleration performance.
5. Creation of green areas along the roads. This measure allows to reduce harmful impact of automobile emissions on the environment by half. One tree in a year absorbs the amount of exhaust gas produced by an average car over 25 000 km of run.

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