THE ROLE OF AIR POLLUTION IN THE DEVELOPMENT OF CARDIOVASCULAR DISEASES

Tadjieva Kh. S.,
Kosimova Kh. T.,
Niyazova O. A.
Tashkent Medical Academy, Tashkent, Uzbekistan

The environmental issues of the 21st century have a serious impact on human health. Air pollution is one of the most pressing problems, reducing the quality of life for millions of people worldwide and contributing to the development of various chronic diseases, particularly cardiovascular diseases.

According to reports from the World Health Organization (WHO), approximately 7 million people die each year due to diseases related to air pollution, with nearly 3 million of these deaths linked to cardiovascular diseases. In areas with high concentrations of fine particulate matter (PM2.5 and PM10), the risk of developing ischemic heart disease, arterial hypertension, and stroke increases by 20-30%.

Pollutants such as nitrogen oxides (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), ozone (O_3), and particulate matter (PM2.5, PM10) harm the human body by inducing oxidative stress in blood vessel walls. This contributes to the onset of atherosclerosis, hypertension, ischemic heart disease, and myocardial infarction.

This article provides an in-depth review of the impact of air pollutants on the cardiovascular system based on scientific data and discusses the issue using statistical evidence.

Main Part: Air Pollution and Its Impact on Cardiovascular Diseases.

Air pollution affects the human body primarily through the respiratory system, eventually entering the circulatory system. This process leads to the following pathological changes:

- Endothelial dysfunction – Substances like NO_2 and PM2.5 reduce the elasticity of blood vessels, facilitating the development of atherosclerosis.
- Arterial hypertension – Airborne pollutants contribute to increased blood pressure, raising the risk of hypertension.
- Increased blood clotting – PM10 and CO alter blood coagulation properties, increasing the risk of thrombosis and heart attacks.
- Oxidative stress and inflammatory processes – Air pollution leads to the formation of free radicals, which play a role in the development of heart failure.

Scientific Studies on Air Pollution and Cardiovascular Diseases.

Numerous international studies confirm that air pollution is a major factor in the development of cardiovascular diseases:

- A 2021 study published in "The Lancet" found that an increase in PM2.5 concentration by 10 μg/m³ was associated with an 8-10% rise in cardiovascular mortality.
- A 2020 study by Harvard University (USA) identified a strong correlation between air pollution and ischemic heart disease, with a 15% increase in heart attack risk in areas with high PM2.5 levels.
- The European ESCAPE project (2021) reported that people living in urban areas with high PM10 and NO_2 levels had a 20% higher likelihood of developing cardiovascular diseases.
- Uzbekistan's Ministry of Health statistics indicate a 35% increase in cardiovascular disease incidence in Tashkent over the past decade, which may be linked to air pollution.

Environmental Conditions in Tashkent and Cardiovascular Diseases

The level of air pollution in Tashkent exceeds international standards:

- PM2.5 and NO_2 concentrations are 2-3 times higher than WHO guidelines.
- The highest pollution levels are observed in the Chilanzar, Yunusabad, and Olmazor districts.
- The number of cardiovascular disease cases has increased by 35% over the last ten years.

These data indicate that implementing ecological measures could significantly reduce the prevalence of cardiovascular diseases.

Measures to Reduce Air Pollution.

To decrease air pollution and lower the risk of cardiovascular diseases, the following measures are necessary:

Strengthening environmental regulations – Reducing industrial emissions and tightening ecological standards for vehicles.

Expanding green areas – Planting more trees and creating urban parks.

Medical prevention – Early detection of cardiovascular diseases and increased public awareness.

Personal protective measures – Using air-filtering masks and maintaining a healthy lifestyle.

Conclusion. Air pollution is one of the key risk factors for cardiovascular diseases. Pollutants such as PM2.5, NO_2, SO_2, and CO negatively impact the cardiovascular system, increasing the risk of hypertension, heart attacks, and heart failure. Research by WHO and other international organizations has confirmed this link.

In Tashkent, this issue remains urgent, and strengthening ecological policies alongside expanding preventive medical measures is crucial for improving public health.

Used literature.

1. Salomova, F. I., Jumakulovich, E. N., & Toshmatova, G. A. (2022). Hygienic Basis for the Use of Specialized Food for Alimental Prevention of Mastopathy. Journal of Pharmaceutical Negative Results, 13.
2. Косимова, Х. Т., & Садирова, М. К. (2018). Нормативная база для проведения мониторинга по изучению влияния соединений азота на здоровье населения. In INTERNATIONAL SCIENTIFIC REVIEW OF THE PROBLEMS OF NATURAL SCIENCES AND MEDICINE (pp. 30-32).
3. Sherkuzieva, G. F., Salomova, F. I., Samigova, N. R., & Yuldasheva, F. U. (2023). RESULTS OF TOXICITY STUDY OF BIOLOGICAL FERTILIZER" YER MALHAMI" FOR INHALATION CHRONIC EFFECTS. Central Asian Journal of Medicine, (1), 110-115.
4. Косимова, Х. Т., & Садирова, М. К. (2018). ОЦЕНКА ТЯЖЕСТИ И НАПРЯЖЕННОСТИ ТРУДОВОЙ ДЕЯТЕЛЬНОСТИ ВРАЧЕЙ ФИЗИОТЕРАПЕВТИЧЕСКИХ КАБИНЕТОВ. In WORLD SCIENCE: PROBLEMS AND INNOVATIONS (pp. 276-278).
5. Sadullaeva, K. A., Salomova, F. I., & Sadirova, M. K. (2023). CAR WASHES AS A SOURCE OF ENVIRONMENTAL POLLUTION. Academia Repository, 4(12), 340-344.
6. Kha, S., Salomova, F. I., & Sadirova, M. K. (2023). Hygienic characteristics of open reservoir pollu. Academia Repository, 4(12), 332-339.
7. Sadullayeva, X. A., Salomova, F. I., & Sadirova, M. K. (2023). Ochiq suv havzalari ifloslanishining Gigiyenik tavsifi. In SPECIAL ISSUE Dedicated to The 10th International Symposium On Important Problems of the Environmental Protection and Human Health Вестник ТМА (pp. 96-99).
8. Kuralbayevna, S. M., Mamanovna, A. A., & Nodir o‘g‘li, J. N. (2024). Specific characteristics of food of karakalpak nation.
9. Рахимов, Б. Б., Мирсагатова, М. Р., & Садирова, М. К. (2024). ВЛИЯНИЕ МОНИТОРИНГА КАЧЕСТВА ВОЗДУХА НА ОБЩЕСТВЕННОЕ ЗДОРОВЬЕ И ЭКОЛОГИЧЕСКУЮ УСТОЙЧИВОСТЬ В УЗБЕКИСТАНЕ. International Conference on Innovations in Applied Sciences, Education and Humanities.
10. Salomova, F. I., Axmadaliyeva, N. O., & Sadirova, M. K. (2024). Qoraqalpog ‘iston respublikasi umumta’lim maktablarida boshlang ‘ich sinf o ‘quvchilarining umum ovqatlanishni tashkillashtirilishi. Academic research in educational sciences, (1), 22-26.
11. Зокирхўжаев, Ш. Я., & Паттахова, М. Х. (2022). Clinical Features and Lab Values of Patients with Chronic Hepatitis after Covid-19.

12. Санадова, Ж. К., Зайдуллаева, М. О., & Садирова, М. К. (2014). Исследование дифференцированного влияния различных факторов окружающей среды на здоровье населения южного приаралья. The Way of Science, 83.
13. Косимова, Х. Т., & Садирова, М. К. (2018). ОЦЕНКА ТЯЖЕСТИ И НАПРЯЖЕННОСТИ ТРУДОВОЙ ДЕЯТЕЛЬНОСТИ ВРАЧЕЙ ФИЗИОТЕРАПЕВТИЧЕСКИХ КАБИНЕТОВ. In WORLD SCIENCE: PROBLEMS AND INNOVATIONS (pp. 276-278).
14. Kasimova, K. T. (2024). The Role Of Ecology In The Development Of Cardiovascular Diseases.
15. Закирходжаев, Ш. Я., & Паттахова, М. Х. (2023). Коррекция диетического питания пациентов с заболеваниями печени после перенесенного Covid-19 с применением местных продуктов.
16. Khilola, T. K. (2024). Assessment of environmental conditions in tashkent and relationship with the population suffering from cardiovascular diseases.
17. Косимова, Х. Т., Мамаджанов, Н. А., & Ибрагимова, Ш. Р. (2020). РОЛЬ СОВРЕМЕННЫХ ПЕДАГОГИЧЕСКИХ ТЕХНОЛОГИЙ В ДАЛЬНЕЙШЕМ СОВЕРШЕНСТВОВАНИИ СИСТЕМЫ ВЫСШЕГО МЕДИЦИНСКОГО ОБРАЗОВАНИЯ В РЕСПУБЛИКЕ УЗБЕКИСТАН. Новый день в медицине, (1), 88-90.
18. Акромов, Д. А., & Касимова, Х. Т. (2017). Результаты изучения токсикологических свойств фунгицида" Вербактин". Молодой ученый, (1-2), 2-3.
19. Salomova, F. I., & Kosimova, H. T. (2017). RELEVANCE OF STUDYING INFLUENCE OF THE BONDS OF NITROGEN POLLUTING THE ENVIRONMENT ON HEALTH OF THE POPULATION SUFFERING CARDIOVASCULAR ILLNESSES (REPUBLIC OF UZBEKISTAN). In INTERNATIONAL SCIENTIFIC REVIEW OF THE PROBLEMS AND PROSPECTS OF MODERN SCIENCE AND EDUCATION (pp. 81-83).
20. Tursunov, D., Sabiorva, R., Kasimova, X., Azizova, N., & Najmiddinova, N. (2016). Status of oxidant and antioxidant systems in alloxan diabetes and ways its correction. In Science and practice: a new level of integration in the modern world (pp. 188-190).
21. Шамуратова, Н. Ш., & Закирходжаев, Ш. Я. (2019). ОЦЕНКА ЭФФЕКТИВНОСТИ ДИЕТОТЕРАПИИ, С ИСПОЛЬЗОВАНИЕМ РАЦИОНА, ОБОГОЩЕННЫХ МЕСТНЫМИ ЗЕРНОВЫМИ КУЛЬТУРАМИ У БОЛЬНЫХ ХРОНИЧЕСКИМИ ГЕПАТИТАМИ. In Академическая наука-проблемы и достижения (pp. 12-14).
22. Ниязова, О. А., & Хайитов, Ж. Б. (2018). оСновнЫе ПРИчИнЫ ПИЩевЫх оТРавленИй у ДеТей. Детская медицина Северо-Запада, 7(1), 234-234.

23. Niyazova, O. A., & Mirsagatova, M. R. (2024). THE STUDY OF RISK FACTORS FOR THE DEVELOPMENT OF CARIES IN PUPILS OF THE FIRST GRADES IN SECONDARY SCHOOLS.
24. Ниязова, О. А., & Валиулин, Р. И. (2022). Изучение и гигиеническая оценка фактического питания студентов (Doctoral dissertation, Молодежный инновационный вестник. Научно-практический журнал Том 11) (Doctoral dissertation, Doctoral dissertation, Молодежный инновационный вестник. Научно-практический журнал).
25. Ниязова, О. А., Хусниддинова, М. С., Махкамова, Д. М., & Нигматуллаева, Д. Ж. (2025, March). МИКРОКЛИМАТ КЛАССНЫХ ПОМЕЩЕНИЙ ОБЩЕОБРАЗОВАТЕЛЬНОЙ ШКОЛЫ И ЗДОРОВЬЕ УЧАЩИХСЯ. In The Conference Hub (pp. 47-52).
26. Akhmadalieva, N. O., Imamova, A. O., Niyazova, O. A., Muratbayeva, A. P., & Umarov, B. A. (2023). HYGIENIC CHARACTERISTICS OF HARMFUL FACTORS OF WORKING CONDITIONS OF INFECTIOUS DISEASES DOCTORS.
27. Bobomuratov, T. A., & Imamova, A. O. Q. (2023). MAKTABGACHA YOSHDAGI BOLALAR ORGANIZIMIDA VITAMIN VA MINERALLAR YETISHMASLIGINING AHAMIYATI. Academic research in educational sciences, (1), 24-30.
28. Bobomuratov, T. A., & Imamova, A. O. K. (2023). Forms and methods for forming a healthy lifestyle in children. Academic research in educational sciences, (1), 19-23.