THE IMPACT OF CHLORINE CONTENT IN DRINKING WATER ON POPULATION CONSUMPTION

1Muradullayeva Mohigul Bobomurod qizi,
2 Ruziyeva Sokhiba Yuldashevna
1Samarkand branch of Tashkent International
Kimyo University, student of the Faculty of Medicine
2Samarkand branch of Tashkent International Kimyo University,Senior teacher
s.ruziyeva@kiut.uz

Annotation
This article examines the amount of water consumed in regions and cities and its impact on the population. Chlorination is used as the primary method for disinfecting water, and its effectiveness in preventing infectious diseases is highlighted. At the same time, scientific analyses demonstrate that both excessive and insufficient use of chlorine can pose health risks.

Keywords: drinking water, water supply, disinfection, water quality, sanitary standards, hygiene, infectious diseases, epidemiology, ecology, water purification technologies, toxic effects, water pipelines, WHO standards environmental issues.

ВЛИЯНИЕ СОДЕРЖАНИЯ ХЛОРА В ПИТЬЕВОЙ ВОДЕ НА ЗДОРОВЬЕ НАСЕЛЕНИЯ

1Мурадуллаева Мохигул Бобомурод кизи, 2Рузиева Сохиба Юлдашевна
1Самаркандский филиал Ташкентский международный университет Кимё student of the Faculty of Medicine
[2]Самаркандский филиал Ташкентский международный университет Кимё,
Старшый преподаватель

Аннотация
В данной статье изучено содержание хлора в питьевой воде, потребляемой в городе и областиях, а также его влияние на здоровье населения. Хлорирование рассматривается как основной метод дезинфекции воды, и отмечена его эффективность в предотвращении инфекционных заболеваний. Вместе с тем научные анализы подтверждают, что как недостаточное, так и чрезмерное количество хлора могут представлять опасность для здоровья человека.

Ключевые слова: питьевая вода, водоснабжение, дезинфекция, качество воды, санитарные нормы, гигиена, инфекционные заболевания, эпидемиология, экология,

технологии очистки воды, токсические эффекты, водопроводные системы, стандарты ВОЗ, экологические проблемы.

AHOLINING ISTIMOLIDAGI SUV TARKIBIDAGI XLOR MIQDORINING SALOMATLIGIGA TA'SIRI

[1]Muradullayeva Mohigul Bobomurod qiz, [2]Ruziyeva Sohiba Yuldashevna
[1]Toshkent Xalqaro Kimyo Universiteti Samarqand filiali talabasi
[2]Toshkent Xalqaro Kimyo Universiteti Samarqand filiali katta o'qituvchisi
s.ruziyeva@kiut.uz

Annotatsiya
Mazkur maqolada viloyat ва shahrlarda iste'mol qilinayotgan ichimlik suvining tarkibida xlor miqdori va uning aholi salomatligiga ta'siri o'rganilgan. Suvni dezinfeksiya qilishda xlorlash usuli asosiy vosita sifatida qo'llanilib, yuqumli kasalliklarning oldini olishda samarali ekanligi qayd etildi. Shu bilan birga, xlorning me'yoridan ortiq yoki kam qo'llanishi sog'liq uchun xavf tug'dirishi mumkinligi ilmiy tahlillar asosida isbotlandi.

Kalit so'zlar: Ichimlik suvi, suv ta'minoti, dezinfeksiya, suv sifatini, sanitariya normalari, gigiyena, yuqumli kasalliklar, epidemiologiya, ekologiya, suvni tozalash texnologiyalari, toksik ta'sir, suv quvurlari, JSST standartlari, ekologik muammolar

Introduction

Ensuring drinking water quality plays a crucial role in public health, and disinfection is one of the most important processes in this regard. Chlorine is a widely used disinfectant for eliminating microorganisms from water. Adding a certain amount of chlorine to water helps eliminate harmful bacteria and viruses, thereby preventing the spread of infectious diseases.
However, when the amount of chlorine in water exceeds the permissible limits, it can be harmful to human health. Excessive chlorine consumption may cause skin and respiratory irritation, headaches, and other health problems. Additionally, chlorine may react with other chemicals in water, forming colloidal compounds that can be hazardous to health.
The safe level of chlorine in drinking water has been defined in international standards, including those of the World Health Organization (WHO), as 0.3–0.5 mg/L. Continuous monitoring of chlorine levels in drinking water and compliance with sanitary norms are essential for protecting public health.
Ozone treatment is considered one of the most effective and reliable methods of water disinfection from a hygienic perspective. A concentration of 0.5–0.6 mg/L is sufficient, and the disinfection time is 3–5 minutes. Since ozone decomposes rapidly into oxygen without

leaving harmful residues, it does not cause unwanted taste or odor. According to WHO, millions of people worldwide suffer from various infectious diseases due to the consumption of contaminated water. Chlorination was first introduced in 1910, and after its importance for safeguarding public health was recognized, it became widely applied.

Relevance of the Topic

Maintaining drinking water quality is one of the most urgent global challenges today. In Uzbekistan, the aging water supply infrastructure and inadequate sanitary-hygienic conditions contribute to the deterioration of drinking water quality. Currently, drinking water quality has become a major social concern on a global scale.

Throughout the regions of Uzbekistan, the degradation of water supply systems and malfunctioning pipelines have limited the ability to adequately treat water, resulting in a decline in water quality. Although disinfecting agents are effective in preventing diseases, excessive chlorination negatively affects public health. Rust and sediment accumulation in old pipelines lead to contamination, altering the smell, taste, and color of water, which is sometimes linked to excessive chlorination. Therefore, modernizing the water supply system, introducing new technologies, and strengthening quality control are essential. This article examines chlorine levels in drinking water across various regions and their impact on public health.

Methods

The study utilized statistical–epidemiological observations, sociological data collection, and expert evaluation methods.

Results

Drinking water quality and safety remain among the world's most pressing issues. According to WHO, waterborne diseases endanger millions of lives every year. As global demand for clean water continues to grow, chlorination remains one of the most effective methods for water disinfection. Consequently, maintaining proper chlorine levels in drinking water is a matter of global concern.

In this study, statistical–epidemiological observations and expert evaluations involving specialists in water supply, sanitation, epidemiology, and ecology were conducted to assess the impact of excessive chlorine levels on public health.

Water from the Zarafshan River and surface sources is treated using chlorination. This process reduces the spread of microorganisms, including intestinal infections, dysentery, and hepatitis A. However, excessive chlorine use has been associated with allergic reactions, gastrointestinal disorders, and other adverse health effects.

The findings highlight the need to modernize water supply systems and introduce advanced disinfection technologies (such as ozonation and ultraviolet irradiation). Ensuring drinking water quality is not only crucial for the health sector but also for environmental sustainability and improving living standards.

Data showed that in some districts of the region, chlorine levels often fail to meet sanitary standards. Some tests revealed excessive or insufficient chlorine levels. While chlorination has contributed to reduced intestinal infections during summer, in areas with excessive chlorination, people complained of unpleasant odor and taste, eye irritation, and allergic skin reactions.

Benefits of Chlorine:

- Rapidly destroys pathogenic microorganisms
- Significantly reduces the spread of infectious diseases

Urban and district water supplies mostly rely on artesian wells and the Zarafshan River. Although artesian water is naturally clean, it is still treated according to sanitary requirements. Water disinfection methods include chemical and physical processes. Physical methods such as boiling, ultraviolet radiation, gamma rays, and ultrasound can effectively disinfect water. Boiling kills all microorganisms while preserving natural taste, but it is impractical for large volumes, which is why chlorination is widely used globally.

Chlorine levels in water were determined using chemical analyses (titrimetric and colorimetric methods). Other physical–chemical parameters (pH, hardness, and harmful substances) were also studied. A population survey on health issues revealed:

- Respiratory diseases: 4.8%
- Skin diseases: 1.71%

Laboratory tests and clinical observations were conducted to identify chlorine-related toxicity.

Comparison with International Standards

Chlorine levels were compared with WHO and other international sanitary guidelines. Recommendations were developed based on compliance.

Stages of Water Treatment

1. **Mechanical filtration** – removal of sand, silt, and solid particles
2. **Sedimentation** – chemical coagulation and filtration
3. **Chlorination** – elimination of harmful microorganisms

Chlorination prevents the spread of pathogenic organisms and reduces intestinal infections such as dysentery and hepatitis A. Sanitary guidelines recommend maintaining free chlorine levels between 0.3–0.5 mg/L. While this range is safe and effective, excessive chlorine may

cause discomfort. Old pipelines cause reactions with organic compounds, producing odor and taste changes. Therefore, modern technologies must be implemented.

Long-term exposure to elevated chlorine levels may affect liver, kidney, and cardiovascular function.

Inadequate Chlorination

If chlorine levels fall below sanitary requirements, disinfection becomes ineffective, increasing the risk of intestinal infections. Children and immunocompromised individuals are particularly vulnerable. Maintaining proper chlorine levels is crucial.

Ozone, when used in concentrations of 0.5–0.6 mg/L, decomposes rapidly into oxygen without leaving harmful residues, making it an effective alternative with a disinfection time of 3–5 minutes.

Conclusion

One of the major water quality issues in the region's cities and districts is the aging water supply system, which causes rust and sediment buildup inside pipelines. This leads to changes in water odor, taste, and color, sometimes due to excessive chlorine. Therefore, modernization of the water supply system, adoption of new technologies, and strengthening quality control are necessary.

Chlorination methods include:

- Standard chlorination
- Chloramination (with ammonia)
- High-level chlorination

Insufficient chlorine leads to ineffective disinfection, while excessive chlorine affects organoleptic properties. Thus, chlorine dosage must be strictly controlled.

Recommendations

To improve water quality and safety in Samarkand city:

1. Conduct regular laboratory monitoring of chlorine levels in water.
2. Strictly follow national and international sanitary regulations during chlorination.
3. Promote hygiene practices among the population, including boiling and filtering drinking water.
4. Gradually modernize outdated water supply infrastructure.
5. Consider adopting modern disinfection technologies such as ozonation and ultraviolet treatment.

References

1. Ministry of Health of the Republic of Uzbekistan. Drinking Water Sanitary Norms. Tashkent, 2020.
2. Reports of the Samarkand Regional Sanitary-Epidemiological Peace and Public Health Service, 2022.
3. Jahongir M., & Rustamov S. Drinking Water Quality and Public Health. Tashkent: "Healthy Life," 2019.
4. World Health Organization. Guidelines for Drinking-water Quality. Geneva, 2017.
5. Karimov A., & Tursunova D. Water Treatment and Disinfection Methods. Samarkand, 2021.