https://doi.org/10.54500/2790-1203-2025-2-125-75-88

Review article

Review of urolithiasis: Global trends and local data for the Turkestan region

Zhanat Nakipova [1], Zhanat Tagayeva [2], Kidirali Karimbayev [3], Ainash Oshibayeva [4], Gulnaz Nuskabayeva [5]

[1] *PhD-student, researcher at the International Kazakh-Turkish University named after Khoja Ahmed Yasawi, Turkestan, Kazakhstan. E-mail: zhanat.nakipova@ayu.edu.kz*

[2] *PhD-student at the International Kazakh-Turkish University named after Khoja Ahmed Yasawi, statistician of the clinical and diagnostic center named after Khoja Ahmed Yasawi, Turkestan, Kazakhstan. E-mail: zhanet16-16@mail.ru*

[3] *Professor, Department of Surgical Diseases, International Kazakh-Turkish University named after Khoja Ahmed Yasawi, Turkestan, Kazakhstan. E-mail: kidirali.karimbayev@ayu.edu.kz*

[4] *Vice Rector for Science and Strategic Development of the International Kazakh-Turkish University named after Khoja Ahmed Yasawi, Turkestan, Kazakhstan. E-mail: ainash.oshibayeva@ayu.edu.kz*

[5] *Dean of the Faculty of Medicine, Candidate of medical sciences, associate professor, Khoja Akhmet Yassawi International Kazakh-Turkish University, Turkestan, Kazakhstan. E-mail: nuskabaeva.gulnaz@ayu.edu.kz*

Abstract

Urolithiasis, or kidney stone disease, continues to present a substantial global health challenge, with expanding prevalence in many parts of the world, including Turkestan. In this review, we provide an overview of the global trends in urolithiasis and subsequently focus on epidemiologic data and risk factors for stone disease relevant to the Turkestan region.

The study's objective is to review urolithiasis according to global tendencies and local data from the Turkestan region, emphasizing factors related to surroundings, dieting habits, and way of life that affect its prevalence. It then outlines culturally appropriate options to prevent the disease in a review paper.

The review draws on a broad range of global and regional epidemiological studies, including data from Turkestan's health departments and hospitals. Local risk factors, including the role of water quality, dietary habits, and fluid consumption, are analyzed in addition to comparisons with global patterns.

The prevalence of urinary stone disease is higher in urban areas within the Turkestan oblast, which are more severely affected by people living there and in cities such as "Turkistan" than in rural districts, e.g., Saryagash. Key regional risk factors include high mineral content in drinking water, low fluid intake, and specific dietary practices. Water quality data reveal elevated calcium, magnesium, and oxalate concentrations in the urban water supply, which correlate with increased kidney stone formation. This review emphasizes the necessity of targeting region-specific risk factors, such as water quality and lifestyle behaviours, in managing urolithiasis in Turkestan. Effective prevention strategies should prioritize improving water quality, promoting dietary changes, and raising public awareness about hydration to reduce disease burden. These global trends are analyzed for insights relevant to crafting a customized solutions approach for the Turkestan region.

Keywords: urolithiasis, global trends, epidemiology, risk factors, prevention, water quality, Turkestan region, kidney stones.

Corresponding author: Nakipova Zhanat, researcher, International Kazakh-Turkish University named after Khoja Ahmed Yasawi, Turkestan, Kazakhstan
Phone: +7 7772330658
E-mail: zhanat.nakipova@ayu.edu.kz

2025; 2 (125): 75-88
Recieved: 04-03-2025
Accepted: 30-03-2025

Introduction

Urolithiasis, or kidney stone disease, is a prevalent and significant health concern worldwide, impacting millions of individuals annually. This condition is characterized by the formation of stones within the urinary system, primarily composed of minerals and salts. The relevance of urolithiasis as a public health issue is underscored by its increasing incidence globally, driven by a combination of dietary, environmental, and genetic factors. Understanding the epidemiology, risk factors, and effective prevention strategies for urolithiasis is crucial for mitigating its impact on public health and improving patient outcomes.

Globally, urolithiasis is a significant cause of morbidity, with an estimated lifetime prevalence ranging from 5% to 15% in developed countries. The condition contributes significantly to healthcare costs due to its recurrent nature and the need for surgical interventions, hospitalizations, and long-term management. Regions with hot climates, such as parts of the Middle East and Southeast Asia, report higher prevalence rates, likely due to the increased risk of dehydration and the resulting concentrated urine, which facilitates stone formation [1-5].

Urolithiasis represents a growing health challenge in Kazakhstan, particularly in the Turkestan region. This southernmost region of Kazakhstan, formerly known as the South Kazakhstan Region, has a unique demographic and environmental profile that may contribute to the prevalence of kidney stones. The region's hot climate, with its specific dietary habits and water quality issues, creates a conducive environment for the development of urolithiasis [6,7].

The Turkestan region, with a population of approximately 2,088,510 as of 2022, has experienced notable demographic changes and urbanization over the past few decades. Turkestan has become an essential economic and cultural hub, historically known as Chimkent Oblast until 1992 and later as South Kazakhstan Region until 2018. The capital city, Turkistan, along with other significant urban centres such as Sayram, Kentau, Arys, Shardara, Zhetisai, Saryagash, and Lenger, form the core of this densely populated region [8].

The prevalence of urolithiasis in Turkestan is influenced by several factors, including its geographical location, climate, and socio-economic conditions. The region's proximity to Uzbekistan and its position along the Syr Darya River, combined with industrial activities such as oil refining in Shymkent, may contribute to environmental risk factors associated with kidney stone formation. Epidemiological data from regional health departments and hospitals indicate a rising trend in urolithiasis cases in Turkestan. Comparative analysis shows that the incidence rates in urban areas, particularly in Turkistan city, are higher than in rural districts like Saryagash. This disparity highlights the need for targeted public health interventions to address the specific risk factors prevalent in different parts of the region [7].

The primary objective of this study is to provide a comprehensive review of the epidemiology, risk factors, and prevention strategies for urolithiasis in the Turkestan region. By examining the influence of environmental, dietary, and genetic factors on the incidence of kidney stones, this study aims to inform public health policies and promote effective preventive measures tailored to the needs of the Turkestan population.

Materials and Methods

In this review, global and regional epidemiological studies were considered to depict an overview of the trend for urolithiasis. The innovation findings are extrapolated using data from international studies and supplemented with local research in Turkestan concerning regional etiological or environmental factors for kidney stone disease. The epidemiological information was specified from health departments and hospitals of the region, which reflected features in urban or rural areas on morbidity (frequency) and prevalence of urolithiasis.

To evaluate local risk factor aetiology, the review considered water quality data, dietary habits, and fluid intake patterns in Turkestan. Data were compared with global estimates to determine similarities and differences in the risk factors associated with kidney stone prevalence. Analysis of this kind allows to greatly deepen the knowledge on local epidemiology and, hence, develop targeted prevention measures at the regional level.

Results

Urolithiasis, a significant urological disease, is prevalent worldwide and ranks second in Kazakhstan after inflammatory renal diseases. According to a study by Fatkhi R.A. and Seidinov S.M., the prevalence of urinary system diseases was investigated in 81,327 individuals hospitalized in the Turkestan region's clinics. This comprehensive study included a range of urological conditions such as chronic tubulointerstitial nephritis, chronic obstructive and non-obstructive pyelonephritis, terminal stages of kidney damage, tubulointerstitial kidney damage, renal cysts, acute tubulointerstitial nephritis, urinary tract infections, chronic nephritic disorders, cystitis, hydronephrosis, and others [7].

The incidence of urinary system pathologies increased by 1.17 times from 2017 to 2018 and from 2018 to 2019, demonstrating a linear growth trend (R2 = 9964). Urolithiasis, with a prevalence rate of 1.4% among all urinary system pathologies, ranked seventh. This data underscores the growing burden of urolithiasis in the Turkestan region, with kidney stones being a notable cause of hospitalizations. The study projects that over 500 individuals may require hospitalization in the coming years, exacerbated by delays in clinical administration due to the COVID-19 pandemic [7].

Globally, urolithiasis affects 5% to 15% of the population, with higher rates observed in the Western Hemisphere. The incidence is notably higher in hot climates and regions with dietary patterns conducive to stone formation. In Kazakhstan, the Turkestan region exhibits a similar trend, with environmental factors such as high temperatures and specific dietary habits contributing to the prevalence of kidney stones [9-11].

Epidemiological data from the Turkestan region indicate that urolithiasis is more prevalent in urban areas, particularly in Turkistan city, compared to rural areas like Saryagash. The male-to-female ratio among patients is 1.34:1, with congenital urinary tract anomalies present in 19.6% of cases. The majority of patients, 51%, are from the southern regions of Kazakhstan. Clinical manifestations include renal colic, urinary tract infections, and macroscopic hematuria. Metabolic disorders such as hypercalciuria and

hyperoxaluria were frequent, necessitating both medical and surgical interventions [7].

The increasing incidence and prevalence of urolithiasis in the Turkestan region highlight the need for targeted public health interventions. Improved diagnostic and treatment facilities and preventive measures focusing on dietary and lifestyle modifications are essential to address this growing health concern. Continuous monitoring and research are imperative to develop effective strategies to reduce the burden of urolithiasis and improve the quality of life for affected individuals in the Turkestan region.

Urolithiasis, or kidney stone disease, is a multifactorial condition that affects individuals across various age groups and genders, with significant demographic variations observed in the Turkestan region. According to the World Health Organization (WHO), genitourinary diseases, including urolithiasis, can affect people of any age, with a notable prevalence among young individuals under 40. In the Turkestan region, an analysis of 81,327 individuals hospitalized for various urinary system diseases revealed a significant incidence of urolithiasis [12].

The male-to-female ratio among urolithiasis patients in the region is approximately 1.34:1, indicating a higher prevalence in males. However, there is a notable incidence among adolescent girls, particularly in the age group of 11 to 17 years, where the frequency of observation is higher in boys ($p = 0.006$). This gender disparity aligns with global trends, where males generally exhibit higher susceptibility to kidney stones, particularly during the peak productive age of 30-60 years. Recent studies have also noted a progressive increase in the development of urolithiasis among women and children, suggesting changing epidemiological patterns [12].

The geographical distribution of urolithiasis in the Turkestan region highlights significant differences between urban and rural areas. Urban centres, such as Turkistan, exhibit higher prevalence rates of urolithiasis than rural districts like Saryagash. Various factors, including environmental conditions, access to healthcare, and lifestyle differences, influence this disparity. In the Turkestan region, the prevalence of urolithiasis is closely linked to environmental factors such as high temperatures and water quality, which contribute to higher stone formation rates. Urban areas tend to have better healthcare infrastructure, leading to more frequent and accurate diagnoses of urolithiasis. However, the lifestyle in urban settings, including dietary habits and sedentary behaviours, also contributes to the higher incidence of kidney stones [13-16].

Conversely, despite having lower reported prevalence rates, rural areas face challenges such as inadequate prevention measures, insufficient staffing of primary care specialists, and limited access to advanced diagnostic and medical facilities. These factors contribute to underreporting and underdiagnosis of urolithiasis in rural settings.

The epidemiological data indicate a rising trend in urolithiasis cases across the Turkestan region, with significant demographic and geographical variations. Understanding these patterns is crucial for developing targeted public health interventions and optimizing medical care for affected populations. Continuous monitoring and assessment of epidemiological processes, along with improved prevention and treatment strategies, are essential to address the growing burden of urolithiasis in the region.

Table 1 provides a comparative analysis of urolithiasis morbidity rates across different regions within Kazakhstan and globally. It highlights the variation in incidence rates, reflecting the influence of regional environmental factors, healthcare infrastructure, and socio-economic conditions on the prevalence of urolithiasis.

Table 1 - Comparative Analysis of Urolithiasis Morbidity Rates in Different Regions

Region	Morbidity Rate (per 100,000 population)	Year
Northern Kazakhstan	4984.8	2022
Almaty Region	3554.6	2022
Zhambyl Region	3988.4	2022
Turkestan Region	2889.6	2022
Atyrau Region	1619.8	2022
USA (Western Hemisphere)	13,000-15,000 (national average)	2022
Canada (Western Hemisphere)	12,000	2022
Europe (Western Hemisphere)	5,000-9,000	2022
Saudi Arabia (Asia)	20,100	2022
Russian Federation	38,000	2022

The morbidity rate of urolithiasis in different regions of Kazakhstan shows significant variability. In 2022, Northern Kazakhstan exhibited the highest morbidity rate, at 4984.8 cases per 100,000 population, followed by the Zhambyl Region with 3988.4 cases and the Almaty Region with 3554.6 cases. Conversely, the Atyrau Region had the lowest rate, at 1619.8 cases per 100,000 population, suggesting relatively better health conditions or possibly underreporting.

In 2022, the morbidity rate in the Turkestan region was 2889.6 cases per 100,000 population. This rate places Turkestan in the mid-range compared to other regions within Kazakhstan but still indicates a significant health burden. The variability in morbidity rates across regions can be attributed to differences in environmental factors, healthcare infrastructure, and socio-economic conditions.

Some interesting patterns emerge when comparing the Turkestan region's morbidity rates with global statistics. Turkestan's morbidity rate of 2889.6 cases per 100,000 is considerably lower than the rates reported in the Western Hemisphere, where the USA and Canada have rates ranging from 12,000 to 15,000 cases per 100,000 population. European countries also exhibit higher rates, ranging from 5,000 to 9,000 cases per 100,000 population.

On the other hand, the morbidity rate in Saudi Arabia is significantly higher at 20,100 cases per 100,000 population, reflecting a severe burden of urolithiasis in the region. The Russian Federation also shows a high prevalence of urolithiasis, with a rate of 38,000 cases per 100,000 population, indicating a substantial health challenge [17-21].

These comparisons highlight the geographical disparities in urolithiasis prevalence, influenced by climate, dietary habits, water quality, and genetic predispositions. The high prevalence in countries like Saudi Arabia and Russia underscores the need for targeted public health interventions and enhanced medical care to address the specific risk factors contributing to the high incidence of urolithiasis.

Overall, the epidemiological data suggest that while the Turkestan region faces a moderate burden of urolithiasis compared to other regions in Kazakhstan and globally, there is still a significant need for effective preventive measures and improved healthcare services to manage and reduce the incidence of this condition. Continuous monitoring, public health education, and implementing region-specific strategies are essential to address the growing challenge of urolithiasis in the Turkestan region and beyond.

Thus, the epidemiological analysis of urolithiasis in the Turkestan region reveals significant insights into this condition's prevalence and demographic distribution. The data indicates that urolithiasis is a notable health burden, with a morbidity rate of 2889.6 cases per 100,000 population in 2022. The analysis shows a higher prevalence of urolithiasis in males, particularly in the age group of 11 to 17 years, though recent trends indicate an increasing incidence among females and children.

Geographically, urban areas, such as Turkistan City, exhibit higher prevalence rates than rural districts like Saryagash. Environmental factors, healthcare accessibility, and lifestyle differences influence this disparity. The comparative analysis with other regions in Kazakhstan and globally highlights that while the Turkestan region faces a moderate burden of urolithiasis, it is considerably lower than in countries like Saudi Arabia and the Russian Federation yet higher than in many Western countries. Overall, the findings underscore the need for targeted public health interventions, improved diagnostic and treatment facilities, and region-specific preventive measures to manage and reduce the incidence of urolithiasis in the Turkestan region. Continuous monitoring and tailored strategies are essential to address this growing health concern effectively.

Urolithiasis, or kidney stone disease, is influenced by a complex interplay of various risk factors. Understanding these factors is crucial for developing effective prevention and management strategies. This section delves into the primary risk factors contributing to urolithiasis, encompassing dietary and lifestyle influences, environmental conditions, and genetic and medical predispositions.

Dietary habits play a significant role in the formation of kidney stones. High intake of oxalate-rich foods, excessive sodium, and low calcium intake are known contributors to stone development. For instance, diets high in spinach, nuts, and chocolate, rich in oxalates, can increase the risk of stone formation. Conversely, balanced diets with adequate calcium and low sodium can mitigate these risks. Hydration is another critical factor; adequate fluid intake helps dilute urine substances that lead to stones. Insufficient hydration, on the other hand, results in concentrated urine, which promotes the crystallization of minerals and the formation of stones.

Environmental factors, particularly water quality, significantly impact the incidence of urolithiasis. The mineral content and purity of drinking water can influence stone formation rates. Regions with hard water or high mineral content, such as calcium and magnesium, often report higher prevalence rates of kidney stones. Assessing and improving water quality is crucial in reducing the incidence of urolithiasis in affected areas.

Genetic predispositions also contribute to the risk of developing kidney stones. A family history of urolithiasis increases an individual's likelihood of experiencing the condition. Genetic factors can alter urine composition, making stone formation more likely. Additionally, certain medical conditions and medications can exacerbate the risk. Chronic kidney disease, diabetes, and some medications can alter urine chemistry in ways that promote stone formation. Understanding these genetic and medical factors is essential for identifying high-risk individuals and implementing targeted preventive measures.

This section explores these factors to provide a comprehensive overview of the multifaceted risk factors for urolithiasis. This knowledge is vital for developing better prevention and treatment strategies tailored to the population's specific needs, ultimately reducing the incidence and burden of kidney stone disease.

Dietary habits significantly influence the formation of kidney stones, making nutrition a crucial factor in preventing urolithiasis. A systematic literature review by Boarin et al. (2018) highlights the importance of dietary modifications in managing and preventing kidney stone recurrence. The review suggests that a predominantly vegetarian diet with a reduced intake of meats and fats can decrease the risk of stone formation. This is because high consumption of animal proteins and fats leads to the accumulation of uric acid, which contributes to stone formation. In contrast, diets rich in fruits and vegetables, which provide beneficial nutrients and promote an alkaline urine environment, can reduce the risk of stone formation [22].

Patients are advised to limit their oxalate-rich foods, such as spinach, nuts, and chocolate, which can contribute to calcium oxalate stone formation. Reducing sodium intake is also essential as high sodium levels increase calcium excretion in urine, further promoting stone formation. Adequate dietary calcium intake is also crucial. While it might seem counterintuitive, low dietary calcium can increase the risk of stones, as it binds to oxalate in the gut, preventing its absorption and subsequent excretion in the urine [23-25].

The review by Yitgin, Asrak, and Tefik (2023) highlights that confident dietary choices can exacerbate or mitigate the risk of stone formation. High consumption of animal proteins and oxalate-rich foods like spinach, nuts, and chocolate can increase the risk of stone formation by contributing to the accumulation of stone-forming substances such as calcium oxalate and uric acid. Conversely, a diet emphasising a high fruit and vegetable intake can help reduce the risk. These foods promote an alkaline urine environment, less conducive to stone formation [28].

According to Shabani et al. (2023), dietary choices significantly influence the risk of developing kidney and urinary tract stones. The study conducted in Iran highlights the impact of various nutritional factors on urolithiasis. High consumption of animal proteins, tea, beverages, coffee, bread, meat, liver, fish, and various canned foods are significantly associated with an increased risk of stone formation. For instance, individuals consuming high amounts of tea (OR=4.70) and coffee (OR=4.39) showed a higher likelihood of developing stones. Conversely, certain foods and drinks have protective effects. The study found that water (OR=0.28), natural juices (OR=0.53), mineral water (OR=0.18), legumes (OR=0.032), butter, cream,

peppermint (OR=0.30), and ice cream (OR=0.203) were associated with a reduced risk of kidney stones. These findings suggest that a balanced diet that limits the intake of high-risk foods and includes protective dietary components can significantly impact the prevention of urolithiasis [29].

Furthermore, comorbidities such as obesity and diabetes can also influence dietary impacts on urolithiasis. Patients with these conditions may require specialized dietary modifications to manage their primary health issues and the risk of stone formation. Comprehensive dietary assessments are recommended to tailor dietary advice to individual needs, taking into account any metabolic disorders detected through detailed anamnesis and analyses.

Adequate fluid intake is one of the most influential and straightforward preventive measures for urolithiasis. The systematic review by Boarin et al. (2018) underscores the importance of consuming more than two litres of water daily to prevent kidney stone recurrence. Sufficient hydration helps to dilute the concentration of stone-forming substances in the urine, thereby reducing the risk of crystallization and stone formation [22].

In addition to water, the review suggests that certain beverages, such as decaffeinated coffee, tea, beer, and wine, may also be associated with a decreased risk of stone formation. These beverages can contribute to overall fluid intake; some may have additional properties that help prevent stone formation. For instance, tea and wine contain antioxidants, which might play a role in reducing oxidative stress, a factor implicated in stone formation [26].

Encouraging patients to maintain a high fluid intake is crucial, especially in hot climates with a higher risk of dehydration. Dehydration leads to concentrated urine, a significant risk factor for kidney stones. Clinicians should educate patients about the importance of regular fluid intake throughout the day and recommend strategies such as carrying a water bottle and setting reminders to drink water [27].

According to Yitgin et al. (2023), a daily fluid intake of 2.5–3.0 litres, or maintaining a diuresis of 2.0–2.5 litres per day, is recommended to prevent the recurrence of kidney stones. Sufficient hydration helps dilute the urine, reducing the concentration of stone-forming substances and lowering the risk of crystallization and stone formation. However, not all beverages are beneficial. For instance, sugary drinks and beverages high in oxalates, such as certain teas, may increase the risk of stone formation. On the other hand, water remains the best choice for hydration, and moderate consumption of beverages like citrus juices can be beneficial due to their citrate content, inhibiting stone formation [28].

Shabani et al. (2023) emphasize the importance of sufficient fluids to reduce the concentration of stone-forming substances in the urine. The study recommends a daily fluid intake of 2.5–3.0 litres or achieving a diuresis of 2.0–2.5 litres per day to prevent stone recurrence. The data showed that individuals consuming 4-5 glasses of water daily had a 72% lower risk of kidney and urinary tract stones than those consuming up to one glass per day (OR=0.28) [29].

However, not all fluids are beneficial. The study revealed that high consumption of tea and other sugary beverages increases the risk of stone formation. Therefore, while maintaining adequate hydration is essential, the type of fluids consumed also matters. Water remains the most effective beverage for preventing urolithiasis, while moderation is advised for tea, coffee, and sugary drinks. The role of hydration is not limited to the quantity of fluid intake but also includes the quality of fluids consumed. Clinicians should guide patients on appropriate fluid choices and encourage consistent hydration practices, particularly in hot climates or during increased physical activity [30-33].

In summary, dietary and lifestyle modifications, including a balanced diet rich in fruits and vegetables, limited intake of animal proteins and fats, and adequate hydration, are fundamental in preventing and managing urolithiasis. These preventive measures reduce the risk of initial stone formation and help prevent recurrence, thereby improving the quality of life for individuals prone to kidney stones.

The following Figure 1 outlines the critical dietary and lifestyle factors influencing the formation and prevention of urolithiasis. It highlights the impact of various dietary habits, including the benefits of a predominantly vegetarian diet and the risks associated with high consumption of animal proteins and oxalate-rich foods. The diagram also emphasizes the importance of adequate hydration, detailing the recommended daily fluid intake and the types of beverages that can either mitigate or exacerbate the risk of kidney stones. This comprehensive overview serves as a guide for effective prevention and management strategies for urolithiasis.

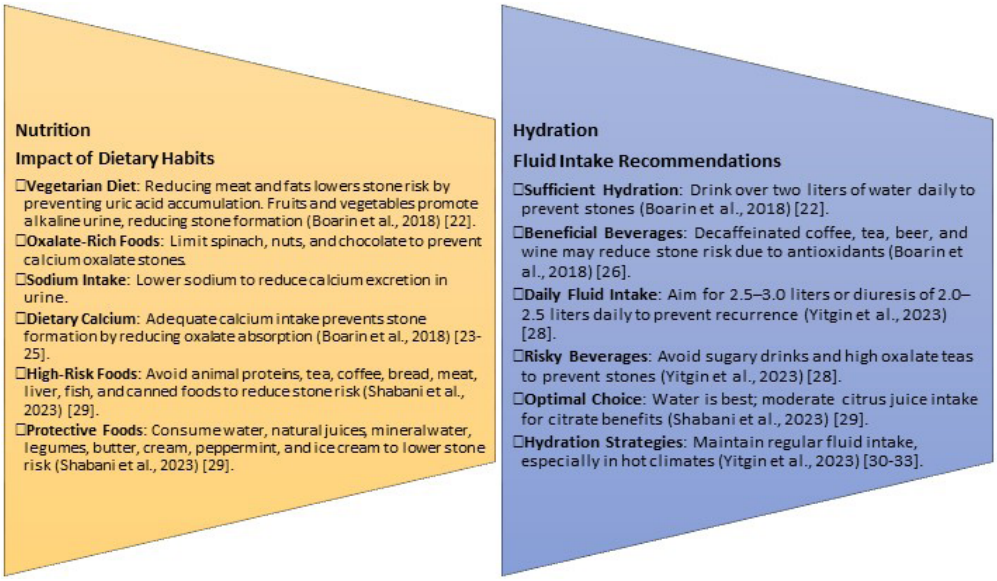

Figure 1 - Dietary and Lifestyle Factors

The diagram above highlights key dietary and hydration factors for preventing urolithiasis. It emphasizes the benefits of a vegetarian diet rich in fruits and vegetables, which promote alkaline urine and reduce stone risk while advising against high intake of animal proteins, oxalate-rich foods, and sodium. Adequate calcium intake is crucial to prevent oxalate absorption. Hydration is equally essential, and over two litres of water should be recommended daily while avoiding sugary and high-oxalate beverages. Beneficial drinks include decaffeinated coffee, tea, beer, and wine for their antioxidant properties. Consistent fluid intake, especially in hot climates, reduces stone formation risk.

We will further discuss environmental factors, particularly the influence of drinking water quality on the incidence of urolithiasis. Assessing water quality is crucial for understanding its role in stone formation and developing preventive strategies.

Water quality is a critical environmental factor influencing the incidence of urolithiasis. According to Abboud (2018), the prevalence of urolithiasis in Northern and Central Jordan is significantly affected by various environmental, geographical, and geological factors. The study collected over 250 urinary stone samples from five hospitals in Jordan, revealing a strong relationship between water quality and stone formation. High concentrations of bicarbonates and fluoride in water, typical in semi-arid to arid regions, contribute to the formation and growth of urinary stones. Water hardness, particularly with bicarbonate concentrations exceeding 300 mg/L, is a significant risk factor for forming oxalate stones. The local climatic conditions, characterized by high summer temperatures and excessive sunlight exposure, further exacerbate the risk. Regions with high temperatures (>20ºC), increased solar radiation, and altitudes above 500 meters are particularly vulnerable. These environmental factors, combined with demographic characteristics such as age (over 40 years) and gender, help explain the high prevalence of urolithiasis in these areas. The study found the highest prevalence in the governorate of Irbid, linking these environmental and geographical factors to the increased risk of urinary stone disease among the local population [34].

Water quality is a crucial environmental factor influencing the incidence of urolithiasis. Contaminated drinking water, particularly with high concentrations of minerals and pollutants, can significantly increase the risk of kidney stone formation. In regions like Kazakhstan, where industrial activities such as uranium mining are prevalent, water pollution poses serious health risks. Studies have shown a high prevalence of kidney diseases in areas with poor water quality, linking contaminants like uranium to increased rates of urolithiasis. Ensuring water security and improving water quality through rigorous monitoring and developing comprehensive water security indicators are essential to mitigating these risks. Effective management strategies and integrating water quality indicators into national policies can help reduce the incidence of urolithiasis and protect public health [35-36].

Water quality is a significant environmental factor influencing the incidence of urolithiasis, particularly in regions with industrial activities such as uranium mining. Uranium mining in South Kazakhstan has led to environmental pollution, posing health risks to residents due to uranium's toxic and radioactive properties. Preliminary studies indicate that the Syrdarya uranium ore province exhibits a high prevalence of urinary system pathologies. A retrospective cohort study assessed kidney disease prevalence and urinary uranium concentrations in adults living near a uranium mine. The study, which included men and women over 18 diagnosed with kidney disease, revealed that the leading group had a kidney pathology prevalence rate of 239.5 per 1000 people, significantly higher (1.3-1.5 times) than control groups. This heightened prevalence correlates with gender, employment status, and duration of residence in the Uranium Ore Province. Urine samples from Bidaykol village residents showed higher uranium content than those from control groups. These findings underscore the critical public health and environmental challenges in uranium mining areas and highlight the need for effective measures to mitigate the impact of water quality on kidney health in these regions [37].

The incidence of urolithiasis is influenced by various risk factors, with environmental factors, particularly water quality, playing a significant role. Contaminated drinking water, as observed in regions affected by uranium mining in South Kazakhstan, can lead to higher concentrations of toxic substances like uranium, significantly increasing the prevalence of kidney stones. The high incidence of urinary system pathologies in these areas underscores the need for comprehensive public health interventions and stringent water quality monitoring. Effective management and mitigation strategies must be implemented to reduce exposure to harmful environmental pollutants and improve overall water quality. Addressing these factors is crucial in preventing urolithiasis and enhancing the health and well-being of affected populations.

Water quality is a critical environmental factor influencing the incidence of urolithiasis. Ensuring water security is paramount in Kazakhstan, as highlighted by the national focus on "Ensuring Water Security" during the Security Council meeting on 26 June 2019. Recent efforts in Kazakhstan have centred on identifying water security priorities and establishing indicators to monitor and measure progress towards achieving water security goals [38].

Developing a national water security indicators framework has been pivotal in aligning Kazakhstan's water security goals with nationalized Green Growth Indicators (GGIs) and Sustainable Development Goal (SDG) indicators. These indicators help track progress towards comprehensive water security targets and address critical issues such as water quality, availability, and management [38].

Despite these advancements, significant challenges must improve data collection and reporting. Integrating water security indicators into relevant policy documents, strategies, and plans is essential to ensure technical and political commitment to water security. Poor water quality, often resulting from inadequate infrastructure and pollution, can lead to higher concentrations of harmful substances in drinking water, contributing to the formation of kidney stones. Addressing these challenges is crucial for mitigating the risk of urolithiasis and protecting public health in Kazakhstan. By enhancing water quality monitoring and integrating these indicators into broader environmental and health policies, Kazakhstan can significantly reduce the incidence of urolithiasis linked to environmental factors. This comprehensive approach is essential for safeguarding the population's health and ensuring sustainable water management practices.

The quality of drinking water significantly impacts the incidence of urolithiasis, with various contaminants and environmental factors playing a crucial role. High levels of bicarbonate and fluoride in water increase the risk of

kidney stone formation. Additionally, toxic and radioactive substances like uranium, often found near mining areas, are linked to kidney disease.

Water hardness and exceptionally high bicarbonate levels exceeding 300 mg/L promote the formation of oxalate stones. Environmental factors also contribute to the prevalence of urolithiasis. High temperatures above 20°C, excessive exposure to sunlight, and living at higher altitudes above 500 meters are all associated with an increased risk of stone formation.

Understanding these influences helps in developing preventive strategies and improving water quality to mitigate the risk of urolithiasis (Figure 2).

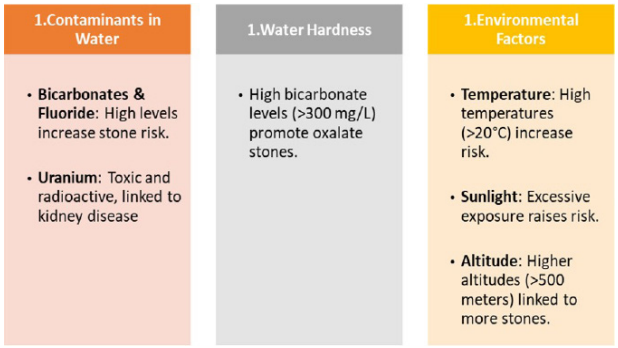

Figure 2 - Influence of Drinking Water Quality on Urolithiasis

Genetic predisposition also plays a significant role in the risk of developing urolithiasis. Individuals with a family history of kidney stones are likelier to develop the condition. This hereditary influence is attributed to genetic factors that affect urine composition, such as high calcium levels, oxalate, and uric acid. Certain inherited metabolic disorders, like cystinuria and hyperoxaluria, also increase the likelihood of stone formation. Studies have shown that mutations in specific genes can lead to abnormalities in how the kidneys handle minerals and other substances, thereby promoting stone formation. Understanding these genetic factors is crucial for identifying individuals at higher risk and implementing preventive measures tailored to their genetic profile.

Genetic predispositions play a significant role in the development of urolithiasis. According to Filippova et al. (2020), various genes are associated with an increased risk of kidney stone formation. For instance, the OPN gene encodes the osteopontin protein, which binds calcium ions and is crucial for tissue calcification and calcium-phosphorus metabolism. Specific polymorphisms in the OPN gene, such as rs11439060, rs1126616, and others, have been strongly associated with urolithiasis. Similarly, the MGP gene, which encodes a protein that suppresses the growth of calcium oxalate crystals, has polymorphisms like rs4236 linked to an increased risk of calcium urolithiasis. Other genes such as PLAU, AQP1, DGKH, SLC34A1, CLDN14, TRPV5, TRPV6, and KLOTHO have also been identified with polymorphisms that elevate the risk of stone formation. Modern genetic technologies, including DNA microarrays and high-throughput DNA sequencing, enable the identification of genetic predispositions, allowing for individualized treatment and preventive measures for patients and their relatives [39].

Genetic predispositions play a significant role in the development of urolithiasis. Research indicates that monogenic kidney stone disorders, such as renal tubular acidosis with deafness, Bartter syndrome, primary hyperoxaluria, and cystinuria, are present in approximately 15% of patients attending kidney stone clinics (Howles & Thakker, 2020). However, nephrolithiasis is multifactorial for most individuals, involving both genetic and environmental factors. Twin studies estimate the heritability of nephrolithiasis to be greater than 45% and hypercalciuria greater than 50%. Genome-wide association and candidate gene studies have identified multiple genes and molecular pathways contributing to the risk of stone formation. These include transporters and channels, ions, protons and amino acids, the calcium-sensing receptor signalling pathway, and metabolic pathways for vitamin D, oxalate, cysteine, purines, and uric acid. Understanding these genetic factors is crucial for developing targeted therapies and precision medicine approaches for patients with nephrolithiasis [41].

Genetic predispositions play a significant role in the development of nephrolithiasis. Studies, such as the twin study by Goldfarb et al. (2019), highlight the substantial heritability of kidney stones. The research, which included 7053 same-sex twin pairs, found that genetics significantly contributed to the risk of stone disease in both women and men. The heritability was estimated at 46% in women and 57% in men, indicating a strong genetic influence, especially in males. This genetic component helps explain the higher prevalence of kidney stones in men than in women. The study also showed that while genetics play a crucial role, unique environmental factors significantly affect women, suggesting that individual-specific environmental influences also contribute to the risk of stone formation [42].

Various medical conditions and medications are known to increase the risk of urolithiasis. Conditions such as obesity, diabetes, hypertension, and gout are commonly associated with a higher incidence of kidney stones. These conditions can alter the metabolic processes in the body, leading to changes in urine composition that favour stone formation. For example, diabetes can cause an increase in urine acidity, which promotes uric acid stone formation. At the same time, obesity is linked to higher levels of urinary oxalate and calcium, increasing the risk of calcium oxalate stones.

Certain medications also contribute to the development of urolithiasis. Diuretics, often prescribed for hypertension, can lead to dehydration and concentrated urine, which increases the risk of stone formation. Similarly, excessive use of calcium-based antacids or supplements can raise calcium levels in the urine. Medications such as topiramate, used for epilepsy and migraines, and indinavir, used for HIV treatment, have been associated with stone formation due to their effects on urine composition.

Recognizing these medical and pharmaceutical risk factors is essential for managing and reducing the risk of urolithiasis in patients with these conditions or those on long-term medication regimens [40].

According to Filippova et al. (2020), certain medical conditions and medications can significantly increase the risk of urolithiasis. Chronic conditions such as obesity, diabetes, and hypertension are commonly associated with a higher incidence of kidney stones. These conditions alter metabolic processes, leading to changes in urine composition that promote stone formation. For example, diabetes can result in more acidic urine, which facilitates the formation of uric acid stones. Obesity can increase the excretion of oxalate and uric acid, contributing to stone formation [39].

Medications also play a crucial role. Some diuretics, particularly thiazide-based, can decrease calcium excretion in the urine, thus reducing the risk of calcium stones. Conversely, other medications like certain antacids, calcium supplements, and protease inhibitors used in HIV treatment can increase the risk of stone formation. Additionally, medications that alter urine pH, such as those used to treat gout, can influence the type of stones formed. For instance, allopurinol, used to treat high uric acid levels, can help prevent uric acid stones but may have less effect on calcium stones.

Several medical conditions and medications can increase the risk of developing kidney stones. Conditions such as obesity, diabetes, hypertension, and metabolic syndrome are associated with a higher incidence of urolithiasis. Additionally, gastrointestinal conditions that cause chronic diarrhoea, such as Crohn's disease or gastric bypass surgery, can lead to dehydration and changes in urine composition, increasing the risk of stone formation. Medications such as diuretics, antacids, and certain anticonvulsants can also contribute to stone risk by altering the balance of stone-forming substances in the urine. Effective management of these comorbid conditions and careful selection of medications are essential for reducing the risk of urolithiasis in susceptible individuals [41].

A study conducted by Goldfarb et al. (2019) showed that certain medical conditions and medications can increase the risk of urolithiasis. Comorbid conditions such as hypercalciuria, renal tubular acidosis, and primary hyperoxaluria are known to predispose individuals to kidney stone formation. Medications that alter urinary solute composition, such as diuretics and certain antiretrovirals, can also contribute to stone development. Identifying and managing these conditions and medications is essential for preventing stone recurrence and mitigating risk factors associated with nephrolithiasis. Understanding genetic predispositions and medical conditions can help develop targeted treatments and preventive strategies for individuals at higher risk of developing kidney stones [42].

In conclusion, understanding genetic predispositions and the influence of medical conditions and medications is essential in managing and preventing urolithiasis. Comprehensive genetic testing and careful consideration of a patient's medical history and current medications can help tailor preventive strategies and treatments, reducing the incidence and recurrence of kidney stones.

Understanding the risk factors for urolithiasis, mainly genetic and medical influences, is crucial for effective prevention and management. Genetic predispositions play a significant role in the development of kidney stones, with studies highlighting the impact of family history and specific genetic polymorphisms. Additionally, various medical conditions and medications contribute to the increased risk of stone formation by altering metabolic processes and urine composition. The table below summarizes key genetic and medical factors that influence the risk of developing urolithiasis, providing insights into the hereditary influences and medical conditions that need to be considered in patient management.

Table 2 - Genetic and Medical Factors Influencing Urolithiasis

Factor	Description	References
Hereditary Influences	Genetic Predispositions: Individuals with a family history of kidney stones are at a higher risk. Genetic factors influence urine composition (calcium, oxalate, uric acid levels). Inherited metabolic disorders like cystinuria and hyperoxaluria also contribute to stone formation	Filippova et al. (2020) [39]
	Genes Involved: Specific genes associated with increased risk include OPN (osteopontin), MGP, PLAU, AQP1, DGKH, SLC34A1, CLDN14, TRPV5, TRPV6, and KLOTHO. Polymorphisms in these genes are linked to stone formation	Filippova et al. (2020) [39]
	Heritability: Twin studies show that nephrolithiasis has a heritability greater than 45%, and hypercalciuria has a heritability greater than 50%	Howles & Thakker (2020) [41]
	Monogenic Disorders: Conditions like renal tubular acidosis, Bartter syndrome, primary hyperoxaluria, and cystinuria are present in about 15% of kidney stone patients	Howles & Thakker (2020) [41]
	Polygenic Factors: Multiple loci and genes contribute to the risk of stone formation, involving pathways for transporters, channels, ions, and metabolic pathways for vitamin D, oxalate, cysteine, purines, and uric acid	Howles & Thakker (2020) [41]
	Twin Study Findings: Genetic factors significantly contribute to the risk of stone disease, with heritability estimated at 46% in women and 57% in men	Goldfarb et al. (2019) [42]
Medical Conditions and Medications	Obesity, Diabetes, Hypertension, Gout: These conditions alter metabolic processes, leading to changes in urine composition, favouring stone formation. Diabetes increases urine acidity; obesity increases urinary oxalate and calcium levels	Filippova et al. (2020) [39]
	Diuretics: Often prescribed for hypertension, diuretics can lead to dehydration and concentrated urine, raising the risk of stone formation	Goldfarb et al. (2019) [42]
	Calcium-Based Antacids/Supplements: Excessive use can raise calcium levels in urine, increasing stone risk.	Goldfarb et al. (2019) [42]
	Topiramate and Indinavir: Medications for epilepsy and HIV treatment, respectively, associated with stone formation due to effects on urine composition	Filippova et al. (2020) [39]
	Gastrointestinal Conditions: Conditions causing chronic diarrhoea (e.g., Crohn's disease, gastric bypass surgery) can lead to dehydration and changes in urine composition, increasing stone risk	Filippova et al. (2020) [39]

In conclusion, the risk factors for urolithiasis are multifaceted, encompassing genetic and medical influences. Hereditary factors play a crucial role, with specific genetic predispositions significantly increasing the likelihood of stone formation. Understanding the genetic basis, including identifying relevant polymorphisms in genes such as OPN,

MGP, and others, helps recognise individuals at higher risk and facilitates the development of personalized preventive strategies. Additionally, medical conditions such as obesity, diabetes, hypertension, and certain gastrointestinal disorders, as well as medications like diuretics and calcium supplements, further exacerbate the risk of urolithiasis. Recognizing and managing these comorbid conditions and carefully selecting medication is essential for mitigating stone formation. By integrating genetic insights with managing medical conditions, healthcare providers can develop comprehensive and practical approaches to prevent and treat urolithiasis, ultimately improving patient outcomes and quality of life.

Discussion

To effectively prevent urolithiasis, comprehensive public health interventions are essential. Educational programs play a critical role in raising awareness and providing the necessary knowledge to prevent the formation of urinary stones.

Initiatives aimed at adults should focus on educating about the importance of diet and hydration in preventing urolithiasis. The European Association of Urology (EAU) guidelines emphasize the necessity of metabolic evaluation and lifestyle adjustments for stone prevention. Educating the public about the need for adequate fluid intake, reducing dietary intake of oxalates, sodium, and animal proteins, and promoting a diet rich in fruits and vegetables can significantly reduce the incidence of stone formation [43].

According to Sagymbayeva (2021), urolithiasis is also a significant concern among the child population, and its social relevance has increased due to global health changes. Educational programs for children and their parents should highlight the importance of preventing stone formation through proper hydration and dietary choices. Emphasis should be placed on the mechanisms of stone formation, such as urine saturation with oxalates, calcium, uric acid, and cystine. Regular medical check-ups and early diagnostic methods, like ultrasound examinations, are crucial in detecting asymptomatic cases. Providing information on treatment standards and new trends in managing obstructive stones can help develop effective preventive strategies for children [44].

By implementing targeted educational programs, both adults and children can be better informed about the risk factors and preventive measures for urolithiasis, leading to a reduction in its prevalence and recurrence.

A study by Trongmatee and Polsook (2020) highlights the effectiveness of self-efficacy enhancement programs in improving recurrence prevention behaviours among patients with urolithiasis. These programs aim to boost patients' confidence in adhering to preventive behaviours, such as maintaining proper hydration and dietary modifications. The King Chulalongkorn Memorial Hospital study showed that patients who participated in a four-week self-efficacy enhancement program had significantly higher scores in recurrence prevention behaviours than those who received conventional care. Such programs can be integrated into patient care plans to reduce recurrence rates [45].

Thus, to effectively prevent urolithiasis, comprehensive public health interventions are essential, with educational programs playing a crucial role in raising awareness and providing the necessary knowledge to prevent urinary stones. For adults, initiatives should focus on diet and hydration, emphasizing metabolic evaluation and lifestyle adjustments per the European Association of Urology (EAU) guidelines. Educating the public about adequate fluid intake, reducing dietary oxalates, sodium, and animal proteins, and promoting a diet rich in fruits and vegetables can significantly reduce stone formation. For children, Sagymbayeva (2021) highlights the growing concern of urolithiasis, stressing the importance of proper hydration, dietary choices, and early diagnostic methods. Providing information on treatment standards and trends in managing obstructive stones can help develop effective preventive strategies. Additionally, a study by Trongmatee and Polsook (2020) demonstrates the effectiveness of self-efficacy enhancement programs in improving recurrence prevention behaviours among patients with urolithiasis, showing that such programs significantly boost patients' confidence in adhering to preventive behaviours like proper hydration and dietary modifications. By integrating targeted educational programs and self-efficacy enhancement initiatives, both adults and children can be better informed about the risk factors and preventive measures for urolithiasis, reducing its prevalence and recurrence [45].

Medical strategies play a pivotal role in preventing urolithiasis, focusing on dietary recommendations, hydration guidelines, and medical treatments to prevent the recurrence of kidney stones. Effective management of urolithiasis involves a comprehensive approach that addresses the various factors contributing to stone formation. The risk of stone recurrence can be significantly reduced by implementing specific dietary changes, ensuring adequate fluid intake, and utilizing appropriate medications. This section will outline the essential medical strategies for preventing urolithiasis, providing practical guidelines and treatment options based on current research and clinical practices [46].

Dietary Recommendations: Dietary modifications play a crucial role in preventing urolithiasis. Patients are advised to reduce their intake of foods high in oxalates, such as spinach, nuts, and chocolate, to prevent the formation of calcium oxalate stones. Limiting sodium intake is also essential, as high sodium levels can increase calcium excretion in urine, promoting stone formation. A diet low in animal proteins and high in fruits and vegetables is recommended to create an alkaline urine environment less conducive to stone formation. Adequate calcium intake should be maintained through dietary sources rather than supplements, as calcium binds to oxalate in the gut, reducing its absorption and subsequent excretion in urine.

The International Consultation on Urolithiasis emphasizes the importance of personalized dietary recommendations based on individual metabolic evaluations. For instance, reducing oxalate-rich foods like spinach, nuts, and chocolate can decrease the risk of calcium oxalate stones. Limiting sodium intake is crucial, as high sodium levels increase calcium excretion in urine. Adequate dietary calcium intake is also recommended to prevent oxalate absorption in the gut, thus reducing the risk of stone formation [46].

Hydration Guidelines: Maintaining proper hydration is one of the most effective measures to prevent the recurrence of kidney stones. Patients are advised to consume at least 2.5 to 3 litres of fluids daily to ensure adequate urine output, which helps dilute stone-forming substances. Water is the best fluid for hydration, but other beverages, such as citrus juices, can also be beneficial due to their citrate content, which inhibits stone formation. It is essential to

avoid beverages that are high in sugar or oxalates, as these can increase the risk of stone development [46].

Medical Treatments: Several medications can be used to prevent the recurrence of urolithiasis, depending on the type of stones and the patient's metabolic profile. Thiazide diuretics are commonly prescribed to reduce calcium excretion in urine for patients with hypercalciuria. Potassium citrate is used to alkalize urine and increase citrate levels, which inhibit stone formation, particularly for patients with uric acid or cystine stones. Allopurinol may be prescribed for patients with high uric acid levels to reduce the formation of uric acid stones. Patients with recurrent stone formation should also undergo a thorough metabolic evaluation to identify specific abnormalities and tailor treatment accordingly. Regular follow-up and monitoring are essential to adjust treatment plans and ensure effective prevention of stone recurrence [46].

By incorporating these dietary recommendations, hydration guidelines, and medical treatments, healthcare providers can significantly reduce the incidence and recurrence of urolithiasis, improving patient outcomes and quality of life.

Accurate urinary stone analysis must be addressed in the context of treatment and recurrence prevention. As highlighted by Siener et al. (2016), precise identification of stone composition using techniques like infrared spectroscopy or X-ray diffraction is crucial for tailoring the most effective dietary and pharmacological interventions. Regular quality control in stone analysis laboratories is essential to ensure reliable results, which form the basis of personalized treatment strategies for stone-forming patients [46 - 47].

Regular follow-up and monitoring, as shown in Figure 3, are essential to ensure these treatments' effectiveness and adjust them as necessary based on the patient's response and any side effects. This comprehensive approach includes assessing patient adherence, identifying refractory cases, and periodically re-evaluating treatment strategies through repeat stone analysis and imaging studies.

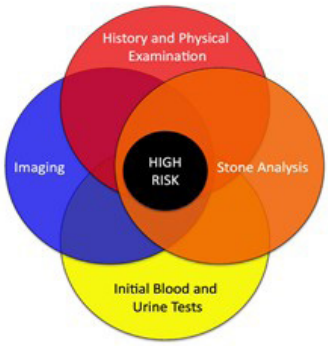

Figure 3 - Essential evaluation of kidney stone formers

Accurate urinary stone analysis must be addressed in the context of treatment and recurrence prevention. As highlighted by Siener et al. (2016), precise identification of stone composition using techniques like infrared spectroscopy or X-ray diffraction is crucial for tailoring the most effective dietary and pharmacological interventions. Regular quality control in stone analysis laboratories is essential to ensure reliable results, which form the basis of personalized treatment strategies for stone-forming patients.

Improving drinking water quality is crucial in preventing urolithiasis, especially in regions with high incidence rates. According to a study by Kurmanbekov et al. (2024) in the Republic of Kazakhstan, there is significant variability in the morbidity rates of genitourinary diseases across different regions, with the highest rates observed in Northern Kazakhstan. This underscores the need for targeted interventions to enhance water quality as a preventive measure against kidney stones and other related health issues.

One policy recommendation is to regularly monitor and test water sources for contaminants such as calcium, oxalate, and other minerals that contribute to stone formation. Establishing stringent water quality standards and ensuring compliance through robust regulatory frameworks can help mitigate these risks.

Investing in infrastructure to improve water filtration and treatment facilities is also essential. Modernizing these facilities to remove harmful substances effectively will significantly reduce the incidence of urolithiasis. Public health campaigns should also educate communities about the importance of using filtered or treated water for drinking and cooking.

Collaborating with international organizations to adopt best practices and advanced water purification technologies can enhance these measures' effectiveness. By prioritizing water quality improvement, policymakers can address a critical risk factor for urolithiasis and promote better health outcomes in the region.

Conclusion

The research aims to review global and regional data on urolithiasis, emphasising environmental factors, dietary habits and lifestyle influences within the Turkestan region. In conclusion, this added value to the review was successfully met by considering the impact of water quality, dietary habits and lifestyle factors on kidney stone development and recurrence, as well as/discordance with international trends - both relevant aspects singled out for comparison.

Strong evidence from global and local studies finds that poor water quality, including high levels of calcium and magnesium with associated oxalates, significantly affects the risk of urolithiasis. Urban areas of Turkestan are identical to most developed regions, with a high rate of natural and anthropogenic (different characteristics) waste, which affects the energy savings needlessly consumed by medical systems.

In some parts, local dietary patterns and low fluid intake will enhance the risk of developing stones. Risk profiles are similar to global tendencies. However, the local ecological system (climate and water quality) is significant for territories," Turkestan.

This review highlights the significance of reiterating the requirement for regional-specific public health interventions for the onset and control of urolithiasis. Additional filtration and more stringent regulations are necessary to protect water quality. Public health campaigns must also continue to implement initiatives that promote both hydration and dietary modifications that limit the intake of stone-promoting substances. The prudent application of these preventive measures, in conjunction with periodic health examinations and community awareness programs, can help to decrease the morbidity caused by urolithiasis.

Through both a global perspective and regional data, this review offers the groundwork for designed prevention and treatment strategies that take into account the unique aspects of urolithiasis in Turkestan. These prevention measures will not only reduce kidney stone disease but also enhance a larger healthcare picture.

Conflict of Interest. The authors declare that there is no conflict of interest. The lead author has completed the conflict of interest statement as required.

References

1. Trinchieri, A. (2008). Epidemiology of urolithiasis: an update. Clinical cases in mineral and bone metabolism, 5(2), 101. https://europepmc.org/article/pmc/pmc2781200

2. Scales Jr, C. D., Smith, A. C., Hanley, J. M., Saigal, C. S., Urologic Diseases in America Project. (2012). Prevalence of kidney stones in the United States. European urology, 62(1), 160-165. https://doi.org/10.1016/j.eururo.2012.03.052

3. Saigal, C. S., Joyce, G., Timilsina, A. R., Urologic Diseases in America Project. (2005). Direct and indirect costs of nephrolithiasis in an employed population: opportunity for disease management?. Kidney international, 68(4), 1808-1814. https://doi.org/10.1111/j.1523-1755.2005.00599.x

4. Gao, S., Yang, W. S., Bray, F., Va, P., Zhang, W., Gao, J., Xiang, Y. B. (2012). Declining rates of hepatocellular carcinoma in urban Shanghai: incidence trends in 1976–2005. European journal of epidemiology, 27, 39-46. https://doi.org/10.1007/s10654-011-9636-8

5. Croppi, E., Ferraro, P. M., Taddei, L., Gambaro, G., GEA Firenze Study Group. (2012). Prevalence of renal stones in an Italian urban population: a general practice-based study. Urological research, 40, 517-522. https://doi.org/10.1007/s00240-012-0477-z

6. Sagymbayeva, A. (2023). Clinical profile, diagnosis and treatment of pediatric urolithiasis: a single center experience in Kazakhstan. Bangladesh Journal of Medical Science, 22(2), 297-304. https://doi.org/10.3329/bjms.v22i2.64986

7. Fatkhi, R. A. (2021). Epidemiology of urolithiasis in the turkestan region. Наука и здравоохранение, (3), 139-145. https://doi.org/10.34689/SH.2021.23.3.016

8. Wikipedia. Turkistan Region. [Cited 20 Jun 2024]. Available from: https://en.wikipedia.org/wiki/Turkistan_Region

9. Bartoletti, R., Cai, T., Mondaini, N., Melone, F., Travaglini, F., Carini, M., Rizzo, M. (2007). Epidemiology and risk factors in urolithiasis. Urologia internationalis, 79. https://doi.org/10.1159/000104434

10. Bichler, K. H., Eipper, E., Naber, K., Braun, V., Zimmermann, R., Lahme, S. (2002). Urinary infection stones. International journal of antimicrobial agents, 19(6), 488-498. https://doi.org/10.1016/S0924-8579(02)00088-2

11. Chand, R. B., Shah, A. K., Pant, D. K., Paudel, S. (2013). Common site of urinary calculi in kidney, ureter and bladder region. Nepal Med Coll J, 15(1), 5-7. https://old.nmcth.edu/images/gallery/Original%20Articles/ucuixRB%20Chand.pdf

12. Fathi, R. (2022). Optimization of urolithiasis treatment and diagnosis in the Turkestan region. Journal of Medicine and Life, 15(3), 344. https://doi.org/10.25122/jml-2021-0107

13. Turganbekova, A. A., Ramilyeva, R. I., Baimukasheva, D. K., Burkitbayev, Z. K., Abdrakhmanova, S. A. (2017). Characterization of the novel HLA-A 32: 95 allele, identified in the Republic of Kazakhstan. HLA: Immune Response Genetics, 90(2).* https://doi.org/10.1111/tan.13028

14. Burkitbaev, Z. K., Raisov, S. D., Turganbekova, A. A., Ramilyeva, I. R., Yakiyaeva, D. U., Baimukasheva, D. K., Zhiburt, E. B. (2015). HLA Alleles in Kazakhstan and in the global genofund. GEMATOLOGIYA I TRANSFUZIOLOGIYA, 60(2), 52-56.

15. Baĭmyshev, E. S., Abzaliev, K. B. (1986). A rare form of internal hernia. Vestnik khirurgii imeni II Grekova, 137(9), 81-82. https://pubmed.ncbi.nlm.nih.gov/3787984/

16. Доброванов, А. Е., Карол, К., Молчан, Я., Ковальчук, В. П. (2019). Актуальность ультразвукового неонатального скрининга органов мочевыделительной системы. Российский вестник перинатологии и педиатрии, 64(3), 68-72. https://doi.org/10.21508/1027-4065-2019-64-3-68-72

Dobrovanov, A. E., Karol, K., Molchan, Ya., Koval`chuk, V. P. (2019). Aktual`nost` ul`trazvukovogo neonatal`nogo skrininga organov mochevy`delitel`noj sistemy`(Relevance of ultrasound neonatal screening of the urinary system) [in Russian]. Rossijskij vestnik perinatologii i pediatrii, 64(3), 68-72. https://doi.org/10.21508/1027-4065-2019-64-3-68-72

17. Kurmanbekov, T., Toguzbaeva, K., Dzhusupov, K., Tazhiyeva, A. (2024). The dynamics of morbidity and provision of urological resources in the Republic of Kazakhstan. Clinical Epidemiology and Global Health, 28, 101676. https://doi.org/10.1016/j.cegh.2024.101676

18. Tian, Y. Q., Yang, J. C., Hu, J. J., Ding, R., Ye, D. W., Shang, J. W. (2023). Trends and risk factors of global incidence, mortality, and disability of genitourinary cancers from 1990 to 2019: Systematic analysis for the Global Burden of Disease Study 2019. Frontiers in public health, 11, 1119374. https://doi.org/10.3389/fpubh.2023.1119374

19. Cohen, A. J., Ndoye, M., Fergus, K. B., Lindsey, J., Butler, C., Patino, G., .Breyer, B. N. (2020). Forecasting limited access to urology in rural communities: analysis of the American Urological Association Census. The Journal of Rural Health, 36(3), 300-306. https://doi.org/10.1111/jrh.12376

20. Fedeli, U., Fedewa, S. A., Ward, E. M. (2011). Treatment of muscle invasive bladder cancer: evidence from the National Cancer Database, 2003 to 2007. The Journal of urology, 185(1), 72-78. https://doi.org/10.1016/j.juro.2010.09.015

21. Niyazbekova, L. S., Sadibekova, Z. U., Myrzagulova, S. E., Tekmanova, A. K., Tokkuliyeva, B. B. (2023). Dynamics of change in population health indicators of the kostanay region and the republic of Kazakhstan. Physical Activity and Health, 7(1). https://doi.org/10.5334/paah.208

22. Boarin, M., Villa, G., Capuzzi, C., Remon, D., Abbadessa, F., Manara, D. F. (2018). Dietary and lifestyle recommendations for urolithiasis prevention: a systematic literature review. International Journal of Urological Nursing, 12(2-3), 53-70. https://doi.org/10.1111/ijun.12169

23. Alatab, S., Pourmand, G., El Howairis, M. E. F., Buchholz, N., Najafi, I., Pourmand, M. R., Pourmand, N. (2016). National profiles of urinary calculi (a comparison between developing and developed worlds). https://sid.ir/paper/309507/en

24. Meschi, T., Maggiore, U., Fiaccadori, E., Schianchi, T., Bosi, S., Adorni, G., Borghi, L. (2004). The effect of fruits and vegetables on urinary stone risk factors. Kidney international, 66(6), 2402-2410. https://doi.org/10.1111/j.1523-1755.2004.66029.x

25. Basiri, A., Shakhssalim, N., Khoshdel, A. R., Radfar, M. H., Pakmanesh, H. (2009). Influential nutrient in urolithiasis incidence: protein or meat?. Journal of Renal Nutrition, 19(5), 396-400. https://doi.org/10.1053/j.jrn.2009.01.017

26. Ke, Z., Wei, Q. (2004). Water for preventing urinary calculi. Cochrane Database of Systematic Reviews, (3). https://doi.org/10.1002/14651858.CD004292.pub2

27. Prasetyo, T., Birowo, P., Rasyid, N. (2013). The influence of increased fluid intake in the prevention of urinary stone formation: a systematic review. Acta Med Indones, 45(4), 253-8.

28. Yitgin, Y., Asrak, H., Tefik, T. (2023). Role, importance and assessment of dietary habits in urolithiasis patient. World journal of urology, 41(5), 1229-1233. https://doi.org/10.1007/s00345-023-04277-3

29. Shabani, E., Khorshidi, A., Sayehmiri, K., Moradi, K., Abdolyousefi, E. N. (2023). The effect of nutritional factors on urolithiasis: A case-control study. Journal of Medicine and Life, 16(7), 1062. https://doi.org/10.25122/jml-2022-0321

30. Ferraro, P. M., Taylor, E. N., Gambaro, G., & Curhan, G. C. (2014). Caffeine intake and the risk of kidney stones. The American journal of clinical nutrition, 100(6), 1596-1603. https://doi.org/10.3945/ajcn.114.089987

31. Anderson, R. A. (2002). A complementary approach to urolithiasis prevention. World journal of urology, 20(5), 294-301. https://doi.org/10.1007/s00345-002-0294-z

32. Tiselius, H. G. (2003). Epidemiology and medical management of stone disease. BJU international, 91(8), 758-767. https://doi.org/10.1046/j.1464-410X.2003.04208.x

33. Safarinejad, M. R. (2007). Adult urolithiasis in a population-based study in Iran: prevalence, incidence, and associated risk factors. Urological research, 35(2), 73-82. https://doi.org/10.1007/s00240-007-0084-6

34. Abboud, I. A. (2018). Prevalence of urolithiasis in adults due to environmental influences: a case study from northern and central Jordan. Jordan J Earth Environ Sci, 9(1), 29-38. http://jjees.hu.edu.jo/files/Vol9N1/JJEES_Vol9_N1_HQ_P4.pdf

35. Basiri, A., Shakhssalim, N., Khoshdel, A. R., Ghahestani, S. M., Basiri, H. (2010). The demographic profile of urolithiasis in Iran: a nationwide epidemiologic study. International urology and nephrology, 42, 119-126. https://doi.org/10.1007/s11255-009-9588-z

36. Brikowski, T. H., Lotan, Y., & Pearle, M. S. (2008). Climate-related increase in the prevalence of urolithiasis in the United States. Proceedings of the National Academy of Sciences, 105(28), 9841-9846. https://doi.org/10.1073/pnas.0709652105

37. Казымбет П.К., Сайфулина Э.А., Куанишкалиева А.К., Махамбетов К.О., Джанабаев Д.Д., Даутбаева З.С., Аумаликова М.Н., Кашкинбаев Ю.Т., Бахтин М.М. Ассоциации урана с заболеваниями почек у населения Южно-Казахстанской урановой области. Научно-исследовательский институт радиобиологии и радиационной защиты НАО «Медицинский университет «Астана», Астана, Казахстан, 2024. https://doi.org/10.22124/CJES.2024.7600

Kazy`mbet P.K., Sajfulina E`.A., Kuanishkalieva A.K., Maxambetov K.O., Dzhanabaev D.D., Dautbaeva Z.S., Aumalikova M.N., Kashkinbaev Yu.T., Baxtin M.M. Associacii urana s zabolevaniyami pochek u naseleniya Yuzhno-Kazaxstanskoj uranovoj oblasti (Associations of uranium with kidney diseases in the population of the South Kazakhstan uranium region. Research Institute of Radiobiology and Radiation Protection) [in Russian]. Nauchno-issledovatel`skij institut radiobiologii i radiacionnoj zashhity` NAO «Medicinskij universitet «Astana», Astana, Kazaxstan, 2024. https://doi.org/10.22124/CJES.2024.7600

38. Oshakbaev, D., Akisheva, Z., Martoussevitch, A. (2021). Developing a national water security indicators framework in Kazakhstan. https://doi.org/10.1787/9ce9aa8c-en

39. Vladimirovna, F. T., Faridovich, K. K., Igorevich, R. V., Mikhailovich, R. L., Georgievich, T. D., Victorovich, E. D., Mikhailovna, L. M. (2020). Genetic factors of polygenic urolithiasis. Urologia Journal, 87(2), 57-64. https://doi.org/10.1177/0391560319898375

40. Аляев, Ю. Г., Газимиев, М. А., Руденко, В. И., Сорокин, Н. И., Саенко, В. С. (2010). Мочекаменная болезнь: современные методы диагностики и лечения: руководство. М.: Гэотар-Медиа, 224, 8.

Alyaev, Yu. G., Gazimiev, M. A., Rudenko, V. I., Sorokin, N. I., Saenko, V. S. (2010). Mochekamennaya bolezn`: sovremenny`e metody` diagnostiki i lecheniya: rukovodstvo (Urolithiasis: modern methods of diagnosis and treatment: manual) [in Russian]. M.: Ge`otar-Media, 224, 8.

41. Howles, S. A., Thakker, R. V. (2020). Genetics of kidney stone disease. Nature Reviews Urology, 17(7), 407-421. https://doi.org/10.1038/s41585-020-0332-x

42. Goldfarb, D. S., Avery, A. R., Beara-Lasic, L., Duncan, G. E., Goldberg, J. (2019). A twin study of genetic influences on nephrolithiasis in women and men. Kidney international reports, 4(4), 535-540. https://doi.org/10.1016/j.ekir.2018.11.017

43. Skolarikos, A., Straub, M., Knoll, T., Sarica, K., Seitz, C., Petřík, A., Türk, C. (2015). Metabolic evaluation and recurrence prevention for urinary stone patients: EAU guidelines. European urology, 67(4), 750-763. https://doi.org/10.1016/j.eururo.2014.10.029

44. Sagymbayeva, A. (2021). Modern vision on the problem of urolithiasis in children: epidemiology, etiopathogenesis, clinical, diagnostics, treatment, metaphylaxis. Journal of Clinical Medicine of Kazakhstan, 18(6), 9-14. https://doi.org/10.23950/jcmk/11346

45. Trongmatee, K., Polsook, R. (2020). Effects of a self-efficacy enhancement program on recurrence prevention behaviors among patients with urolithiasis. Chulalongkorn Medical Journal, 64(1), 79-85. https://doi.org/10.58837/CHULA.CMJ.64.1.10

46. Jung, H., Andonian, S., Assimos, D., Averch, T., Geavlete, P., Kohjimoto, Y., Osther, P. J. (2017). Urolithiasis: evaluation,

dietary factors, and medical management: an update of the 2014 SIU-ICUD international consultation on stone disease. World journal of urology, 35, 1331-1340. https://doi.org/10.1007/s00345-017-2000-1

47. Siener, R., Buchholz, N., Daudon, M., Hess, B., Knoll, T., Osther, P. J., EAU Section of Urolithiasis (EULIS). (2016). Quality assessment of urinary stone analysis: results of a multicenter study of laboratories in Europe. PloS one, 11(6), e0156606. https://doi.org/10.1371/journal.pone.0156606

Несеп тас ауруларына шолу: Халықаралық тенденциялар және Түркістан облысы бойынша жергілікті деректер

Накипова Ж.Ж. [1], Тагаева Ж.А. [2], Каримбаев К.К. [3], Ошибаева А.Е. [4], Нускабаева Г.О. [5]

[1] PhD-студент, ғылыми қызметкер, Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университеті, Түркістан, Қазақстан. E-mail: zhanat.nakipova@ayu.edu.kz

[2] PhD-студент, Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университеті, дәрігер-статистик, Қожа Ахмет Ясауи атындағы Клиника-диагностикалық орталығы, Түркістан, Қазақстан. E-mail: zhanet16-16@mail.ru

[3] Хирургиялық аурулар кафедрасының профессоры, Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университеті, Түркістан, Қазақстан. E-mail: kidirali.karimbayev@ayu.edu.kz

[4] Вице-ректор, қауымдастырылған профессор, Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университеті, Түркістан, Қазақстан. E-mail: ainash.oshibayeva@ayu.edu.kz

[5] Медицина факультетінің деканы, қауымдастырылған профессор, Қожа Ахмет Ясауи атындағы Халықаралық қазақ-түрік университеті, Түркістан, Қазақстан. E-mail: nuskabaeva.gulnaz@ayu.edu.kz

Түйіндеме

Несеп тас ауруы немесе бүйрек тас ауруы дүние жүзінің көптеген бөліктерінде, соның ішінде Түркістанда таралуының кеңеюімен денсаулыққа айтарлықтай жаһандық проблема болып табылады. Бұл шолуда несеп тас ауруының жаһандық тенденцияларына шолу жасалынды және Түркістан аймағына қатысты эпидемиологиялық деректерге, сондай-ақ бүйрек тас ауруының қауіп факторларына назар аударылды.

Шолудың мақсаты: қоршаған ортаға, тамақтану әдеттеріне және оның таралуына әсер ететін өмір салтына байланысты факторларды көрсете отырып, Түркістан облысының жаһандық тенденциялары мен жергілікті деректеріне сәйкес уролитияны зерттеу. Аурудың алдын алудың мәдени тұрғыдан қолайлы нұсқаларын сипаттау.

Несептас ауруы Сарыағаш ауданымен салыстырғанда, Түркістан облысы шегінде орналасқан қалалық жерлерде жоғары. Негізгі аймақтық қауіп факторларына ауыз судағы минералдардың жоғары мөлшері, сұйықтықты аз тұтыну және кейбір диеталық әдеттер жатады. Судың сапасы туралы деректер қалалық сумен жабдықтаудағы кальций, магний және оксалат концентрациясының жоғарылауын көрсетеді, бұл бүйрек тастарының түзілуінің жоғарылауымен байланысты.

Бұл шолу Түркістандағы уролитияны емдеудегі судың сапасы мен өмір салты сияқты аймақтық қауіп факторларын нысанаға алу қажеттілігін көрсетеді. Тиімді алдын алу стратегиялары аурудың ауыртпалығын азайту үшін судың сапасын жақсартуға, диеталық өзгерістерге ықпал етуге және жұртшылықтың ылғалдану туралы хабардарлығын арттыруға басымдық беруі керек. Бұл жаһандық тенденциялар Түркістан облысы үшін жеке шешім қабылдау тәсілін әзірлеуге қатысты ақпарат алу үшін талданды.

Түйін сөздер: бүйрек тас ауруы, уролития, әлемдік тенденциялар, эпидемиология, қауіп факторлары, алдын алу, су сапасы, Түркістан облысы.

Обзор мочекаменной болезни: Мировые тенденции и местные данные для Туркестанской области

Накипова Ж.Ж. [1], Тагаева Ж.А. [2], Каримбаев К.К. [3], Ошибаева А.Е. [4], Нускабаева Г.О. [5]

[1] PhD-студент, научный сотрудник, Международный казахско-турецкий университет имени Ходжи Ахмеда Ясави, Туркестан, Казахстан. E-mail: zhanat.nakipova@ayu.edu.kz

[2] PhD-студент, Международный казахско-турецкий университет имени Ходжи Ахмеда Ясави, врач-статистик, Клинико-диагностический центр имени Ходжи Ахмеда Ясави, Туркестан, Казахстан. E-mail: zhanet16-16@mail.ru

[3] Профессор, Кафедра хирургических болезней, Международный казахско-турецкий университет имени Ходжи Ахмеда Ясави, Туркестан, Казахстан. E-mail: kidirali.karimbayev@ayu.edu.kz

[4] Ассоциированный профессор, Вице-ректор, Международный казахско-турецкий университет имени Ходжи Ахмеда Ясави, Туркестан, Казахстан. E-mail: ainash.oshibayeva@ayu.edu.kz

[5] Декан факультета Медицины, ассоциированный профессор, Международный казахско-турецкий университет имени Ходжи Ахмеда Ясави, Туркестан, Казахстан7 E-mail:nuskabaeva.gulnaz@ayu.edu.kz

Резюме

Уролитиаз, или мочекаменная болезнь, продолжает представлять собой существенную проблему для мирового здравоохранения, ее распространенность растет во многих частях мира, включая Туркестанскую область. В этом обзоре мы представляем обзор мировых тенденций в области мочекаменной болезни и затем фокусируемся на эпидемиологических данных, а также факторах риска мочекаменной болезни, относящихся к Туркестанскому области.

Целью исследования является рассмотрение мочекаменной болезни в соответствии с мировыми тенденциями и местными данными по Туркестанской области, уделяя особое внимание способам, связанным с окружающей средой, пищевыми привычками и образом жизни, влияющими на ее распространенность. Далее в обзорной статье излагаются культурно приемлемые варианты профилактики заболевания.

Преобладание мочекаменной болезни значительно выше в городских районах Туркестанской области, особенно среди жителей города Туркестан, по сравнению с сельскими районами, такими как Сарыагаш. Основными региональными факторами риска являются повышенное содержание минералов в питьевой воде, недостаточное потребление жидкости и определенные диетические привычки. Данные о качестве воды свидетельствуют о повышенной концентрации кальция, магния и оксалатов в городской водоснабжающей системе, что коррелирует с увеличением случаев образования почечных камней.

В этом обзоре подчеркивается необходимость нацеливания на региональные факторы риска, такие как качество воды и образ жизни при лечении мочекаменной болезни в Туркестане. Эффективные стратегии профилактики должны уделять первоочередное внимание улучшению качества воды, содействию изменениям в питании и повышению осведомленности общественности о гидратации для снижения бремени болезней. Эти глобальные тенденции анализируются для получения информации, актуальной для разработки индивидуального подхода к решениям для Туркестанской области.

Ключевые слова: мочекаменная болезнь, глобальные тенденции, эпидемиология, факторы риска, профилактика, качество воды, Туркестанская область, камни в почках.