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ORIGINAL RESEARCH

Assessment of Knowledge, Attitude, and Practice Toward Urolithiasis among Patients in Sulaymaniyah City, Iraq

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ABSTRACT

Background: Urinary stone disease , also known as urolithiasis, refers to the condition characterized by the formation of stones or calcifications in the urinary system.
Objectives: This study aimed to assess Knowledge, Attitude, and Practice concerning Stone in Patients with Urolithiasis in Sulaymaniyah City/ Iraq.
Methodology: A Quantitative, descriptive-analytic design was conducted in Shar and Teaching Hospital from 6th November 2024 to 25th January 2025. A total of 130 participants were included in this study through a convenience sampling method. Data were gathered using a structured questionnaire that focused on sociodemographic factors and assessment of patients knowledge, attitude, and practice regarding urolithiasis.
Results: A third of the 130 people who took part in the study had a positive outlook on the topic of preventing urinary stone illness, and the same percentage had strong knowledge on the subject. individuals older than 39 years old demonstrated significantly higher results on the knowledge test compared to younger individuals (p=0.047). In terms of knowledge, females also outperformed males (p=0.044). Also, for individuals with a diploma or an institute-level education, there was a highly significant correlation between educational attainment and knowledge levels (p=0.000).
Conclusion: It was found that patients lacked sufficient knowledge regarding the prevention of urinary tract stones. Additionally, no correlation was identified between the patients' sociodemographic characteristics and their awareness of stone prevention.

Keywords: Urolithiasis, Knowledge, Attitude, Practice, Educational Level.

INTRODUCTION

Urolithiasis, often called kidney stones or nephrolithiasis, is a major health concern across the world. Its occurrence is on the rise, and there are many consequences that can arise from it. The kidneys are the most common site for the development of kidney stones, although they can also occur in the ureters, bladder, or urethra. These masses are hard and crystalline. This process, called lithogenesis, occurs when the urinary system's stone-forming promoters and inhibitors are biochemically out of whack. The prevalence, severity, and cost of kidney stones make them an important issue in public health (Ezer et al., 2024).

There are 4.2 cases per 1,000 people in Iran who suffer from this illness. Among those aged 40 and up, the claimed frequency is almost 20%; this includes the elderly. Males, especially those in their twenties and thirties, are more likely than females to

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experience urolithiasis. There are considerable regional differences in the worldwide occurrence of kidney stones; for example, it might be anywhere Asia has a prevalence of 1% to 5%, North America of 7% to 13%, and Europe of 5% to 9%. Environmental factors, such as dehydration, which is frequently worsened by high temperatures, contribute to the increased occurrence of kidney stones in countries with hot and dry climates, such as those in the Middle East (Delbari et al., 2025).

The male-to-female ratio varies from about 2.5:1 to 4:1 among regions in Iraq, indicating that urolithiasis is more common in males than females. Iraq has a high incidence of metabolic abnormalities in children younger than five years old, with the worst hit being the 30 - to 50 – year - old age bracket. Adults, especially men over the age of 60, in wealthy Middle Eastern countries like the Gulf states have an extremely high lifetime prevalence of upper urinary tract stones with rates reaching 20% (Fadhil, 2022).

Geograghical and climatic conditions play a crucial effect in the development of urolithiasis; in Iraq, where summer temperatures can approach 50°C, more than half of urological patients present with kidney stones. There appears to be a correlation between environmental and nutritional variables and the increasing frequency among children and adolescents, especially among teenage girls (Moftakhar et al., 2022; Shoag et al., 2015).

The metabolic abnormalities that increase the chance of crystallization and are closely associated with kidney stone development include hypercalciuria, hyperoxaluria, and hypocitraturia. One of the main causes of kidney stones is a diet high in oxalate-rich foods, salt, and animal proteins. Another important consideration is water consumption; dehydration causes urine to be more concentrated, which in turn increases the likelihood of crystal formation. Obesity, diabetes, and hypertension are associated with changes in urine composition and an increase in stone formation; hereditary factors, particularly a history of kidney stones in the family, can greatly enhance the risk (Takeuchi & Aoyagi, 2019; Lotan et al., 2017)

Not only does kidney stone illness create excruciating pain and suffering, but it also has major monetary and healthcare ramifications. With a recurrence incidence of 26% within five years and up to 75% over a 20 - year period, the dangerously high recurrence rate of kidney stones is a major concern (Sohgaura & Bigoniya, 2017). Potentially life-threatening consequences of the condition include renal colic, hematuria, UTIs, obstructive nephropathy, and, in the worst-case scenario, kidney failure (Alshubaili et al., 2024). These issues can cause a patient to spend more money on therapy, spend more time in the hospital, and have a significantly worse quality of life overall. Additional risk factors for metabolic diseases like diabetes and obesity, hypertension and atherosclerosis, and cardiovascular disease are kidney stones (Dhondup et al., 2018; Moudi et al., 2017).

Classification of kidney stones is based on the chemicals of kidney stones, the most common are struvite, calcium oxalate, calcium phosphate, uric acid, and cystine. Uric acid stones constitute around 10% of cases, while calcium oxalate stones constitute 75% to 85%. About 7–8% of stones are struvite, which is commonly linked to UTIs produced by urease-producing bacteria. Less common but no less serious are cystine stones, which arise from an uncommon hereditary condition (Türk et al., 2016).

Modifying one's food, being properly hydrated, and taking medication all work together to reduce the likelihood of kidney stones. Reducing stone formation is best accomplished by increasing fluid consumption, which helps dilute urine chemicals that contribute to crystallization. Kidney stone prevention measures include eating more fruits and vegetables and reducing sodium, animal protein, and oxalates in the diet. Healthcare practitioners may recommend thiazide diuretics, potassium citrate, or allopurinol to patients with certain metabolic disorders or those who are more likely to experience a recurrence in order to

manage the levels of uric acid, calcium, and oxalate in the urine. More substantial stones may require surgical procedures including ureteroscopy, percutaneous nephrolithotomy, or extracorporeal shock wave lithotripsy (Yuri et al., 2018; Basiri et al., 2024).

The link between urolithiasis and the need for KAP assessment lies in the alarming recurrence of kidney stones, which is strongly linked to dietary habits, highlight the necessity for KAP (Knowledge, Awareness, and Practice) assessment. Research shows that patients frequently make mistakes that lead to stone formation because they don't know enough about dietary control and risk factors. Healthcare practitioners can better educate patients and enhance dietary management to reduce the frequency of urolithiasis episodes by using the results of a KAP evaluation to pinpoint areas of poor knowledge and adherence to dietary recommendations. According to (Sowtali et al., 2022; Shastri et al., 2023).

AIMS OF THE STUDY

This study aimed to assess Knowledge, Attitude, and Practice concerning Stone in Patients with Urolithiasis in Sulaymaniyah City/ Iraq.

METHODOLOGY

Study Design and Setting

The current study, which ran from 6th November 2024 to 25th January 2025, used a descriptive(cross – sectional) study design.

Setting of the Study

This study was conducted in two hospitals in Sulaymaniyah city (Urology ward in Surgical-Teaching Hospital and Urology ward in Shar Hospital). The selected ward are government medical facilities for citizens that provide free services and treatment.

The Sample of the Study

A non- probability convenience sampling technique was applied in the present study. 130 patients on Urology ward in two Hospitals in Sulaimanyeah City participated in the present study. Eligible participants included those who were diagnosed with urolithiasis and participants had to be aged 18 years. Participants were excluded if they were not willing to participate, suffered from critical conditions, and were cognitively unable to participate.

Data collection

Data were collected through the use of a questionnaire by face -to-face interview with each patient.

Study Instruments

A. The sociodemographic data includes the participants' demographics such as their age, gender, marital status, educational level, occupation, economic status, and residency. **B.** Clinical characteristics, which included clinical characteristics of stone such as site of stone, size, spontaneous passage, mode of treatment, and result of treatment. **C.** Consists of questions related to the knowledge of prevention strategies for urinary stones, including 10 questions about fluid intake, causes of urinary tract stones, conditions affecting stone movement, dietary factors, and medication intake. These questions assess participants' awareness of lifestyle factors, such as fluid consumption, the role of exercise, and dietary habits, including the intake of certain foods and medications that could influence kidney stone formation. **D.** The questionnaire measures participants' attitude toward prevention with 9 items that explore perceptions about the seriousness of kidney stones, the possibility of preventing them, the impact of climate and diet on stone formation, and the effectiveness of traditional versus modern medicine in treatment. It also evaluates how likely participants are to follow medical advice on preventing kidney stones. **E.** Focuses on self-practice and contains 13 questions that examine participants' behaviors, such as daily water intake, consumption of mineral water versus tap water, dietary habits related to reducing kidney stone risk, and lifestyle changes made after a diagnosis of kidney stones. It also explores whether

participants take multivitamins, analgesics, or use herbal remedies as part of their prevention or treatment strategies.

STATISTICAL ANALYSIS

The data were analyzed using Statistical Package for the Social Sciences (SPSS) version (27.0). The data analysis was performed through descriptive statistics (frequency, percentage, mean, and standard deviation). We also used inferential statistics such as the correlation test, chi-square, p-value, and Fisher Exact Test.

Sample Size Calculations

Sample size was calculated using the formula for estimating proportion: n = z 2 p (100 − p)/e2 were n is the required sample size, z is a value of corresponding to significant level, p is the expected percentage of people with adequate knowledge and practice, and e is the level of precision. We have now clarified the sampling technique and provided an explanation of the method used to calculate the sample size. Furthermore, we have specified that the questionnaire was adapted from previous validated studies, and we have added details on its validity and reliability, including Cronbach's alpha values.

Validity of the questionnaire

The validity of the questionnaire is determination of the extent to which the instrument actually reflects the abstract concept being examined, stated that a drafted questionnaire should always be ready for establishing validity, and they reported that validity is the amount of systemic or built in error in the questionnaire and emphasized that validity of a questionnaire can be established using a panel of expert.

The face validity of the present study questionnaire was established through a panel of (12) experts of different specialties in Nursing. These experts were asked to investigate the questionnaire for content clarity, relevancy, and adequacy, in order to achieve the present study objectives. The majority pf experts were agreed on the preliminary questionnaire which appropriately developed to measure the phenomenon underlying this study.

Reliability of questionnaire

Reliability of the questionnaire was determined through the use of test-retest Approach, (Stability) the person correlation coefficient ® was used for the determination of the reliability of the study instrument, test-retest correlation coefficient of reliability (r=0.92). The interrater-reliability on (10 cases) by interview the researcher. they collected data, Alpha-chron bach correlation coefficient was computedto calculate coefficient of the instrument showed to be (r=0.087, 0.086 and 0.91) when tested.

RESULTS

Table (1) shows the socio-demographic characteristics of 130 participants. with a mean age of 42.4 years, the majority are above the age of 39 (56.2%). 68.5 percent of the people who took part are men, and 35.4 percent of them have finished primary school. A large percentage of the population resides in urban areas (56.2), and self-employed people make up 24.6%of the workforce. Married people make up the majority (78.5%), and nearly half of those people have barely sufficient (48.5%). Concerning body mass index (BMI), 1.5% were underweight, 25.4% had a normal BMI, 51.5% were obese, and 21.5% were overweight.

Table (2) illustrated the significance of participants' sociodemographic attributes in influencing their knowledge and behaviors for the prevention of urinary stones. Older people had superior knowledge while demonstrating similar practice scores, as indicated by the p values, which reveal substantial differences, particularly with age (p = 0.047 for knowledge, p = 0.000 for practice). A gender factor is present; males outperformed females on both the knowledge exam (p = 0.044) and the practice test (p = 0.000). Elevated educational attainment correlated with enhanced scores universally (p = 0.000 for knowledge and practice), illustrating the significant impact of education.

Retirees possess the highest level of knowledge and exhibit the most pronounced inequalities in practice regarding profession (p=0.000). Urban residents often exhibit elevated practice scores (p=0.001). No statistically significant differences were seen based on marital status however, a robust association existed between socioeconomic level and both knowledge and practice (p=0.021 and p=0.010).

Table (3) present the distribution of participants knowledge, attitudes, and self-practice on the prevention of urinary stone disease. A minority of persons exhibited excellent knowledge (30.0%) or positive attitude (30.8%) toward prevention, whereas the majority had inadequate knowledge (36.2%) and a negative attitude (38.5%). The majority of participants (40.0%) claimed their approaches were fair, however just 22.3% asserted they were effective in averting injury. These data indicate that numerous individuals lack sufficient knowledge, possess an incorrect mindset, and fail to take adequate measures to prevent urinary stone illness. It is evident that individuals require additional information and programs to facilitate behavioral modification.

Table (4) This table presents the Pearson correlation coefficients for knowledge, attitude, and self-practice on the prevention of urinary stone disease. Statistically, there is no correlation between knowledge and attitude toward prevention (p = 0.064), and the negative correlation (-0.163) indicates that this may not consistently hold true. A somewhat positive (0.304) and statistically significant (p = 0.000) correlation between knowledge and self-practice indicates that increased information is associated with enhanced participation in preventative actions. Conversely, a positive attitude appears to exert minimal influence on the implementation of preventative measures, since the correlation between the two is low (0.127) and statistically insignificant (p = 0.151). To enhance preventative behaviors, it is essential to focus on both information and practice, as the findings indicate that knowledge exerts a greater influence on self-practice than attitude.

Table (5) shows that knowledge has a positive effect on attitude. The correlation between knowledge and attitude is robust and statistically significant. With a p-value of 0.000 and an estimate of 0.219, the second row shows that attitude positively affects practice. This link is highly significant, showing that as attitude improves, practice also improves. Lastly, the knowledge-practice relationship is further supported by the third row, which shows that knowledge has a direct impact on practice (estimate of 0.140, p-value 0.000). Knowledge is crucial for improving attitudes and practices, as all relationships are statistically significant.

DISCUSSION:

The result of the study revealed that more than half of the patients were male gender, these findings corroborated by results of study done by (Patel et al., 2021).

Between the ages of 15 and 49, the prevalence and incidence of kidney stone disease are 1.5 to 2.5 times lower in females than in males of the same age group (Stern et al., 2019).

The prevalence of urinary urolithiasis is more common in older adults, according to research out of Morocco, especially those over the age of 48. According to (Setyawan et al., 2018), the body's ability to regulate temperature in older persons gets slower, leading to an increase in the incidence of urine crystal formation.

The study found that more than two-thirds of the participants had barely sufficient monthly income, this finding is consistent with the results of (Bayne et al., 2022).

Regarding BMI, the majority of participants were classified as obese, this findings align with the study by (Ye et al., 2023), which demonstrated that BMI was significantly higher in individuals with urinary stones.

It was shown in this study that most of the patients had only completed high school. According to (Ismael, 2021), the bulk of the urolithiasis patients

in an Egyptian study were college educated and participated in group activities.

The diagnosis of urinary stones was also substantially associated with marital status, educational level, and occupation, according to a recent study. The prevalence of diagnosed urinary stones was higher among married, college-educated, and employed respondents than among other groups. (Adawi et al., 2023).

Older people had superior knowledge while demonstrating similar practice scores, which indicated that although older adults might have more information. Findings from the study by (Ellison & Tasian, 2021) corroborated the observation that younger participants exhibited more positive attitudes, while older participants possessed more information but engaged in less preventive behavior.

People who had completed some form of postsecondary education, particularly a certificate or higher, had superior attitudes and knowledge. These findings is similar to the research done by (Jehn, 2022).

Retirees had the most knowledge but the worst attitude. By contrast, as pointed out by (Ellison & Tasian, 2021), self-employed people and housewives exhibited more balanced scores in terms of knowledge, attitude, and practice. People living in urban areas scored better on tests of both knowledge and practice, but those living in rural areas scored lower on all measures. Similar findings were reported by (Zhang et al., 2020).

It was not statistically significant, but there was a favorable correlation between attitude and self-practice, according to research by (Chen et al., 2024) when faced with real-world obstacles like time restrictions, budgetary limitations, or competing objectives, people's intentions and actions don't always match. Consistent with the present results, which show insufficient awareness on the prevention of urinary stone illness, a study by (Sowtali et al., 2022) found that the general public has little knowledge about urolithiasis.

There is evidence from multiple studies that people can reduce their risk of urinary stone illness by increasing their knowledge, attitude, and behavior. An increase in knowledge was found to have a direct impact on preventative behaviors, since it enhanced attitudes and practice (Lv et al., 2024).

Knowledge has a direct impact on attitude and practice in patients with urinary stone disease, Previous investigations have found similar results conducted by (Wang et al., 2022). In addition, the significance of information in enhancing health habits and decreasing risks related to kidney stone illness was highlighted (Sun et al., 2023).

The study examined various relationships between socio-demographic characteristics, knowledge, attitude, and self-practice regarding urinary stone disease prevention.

The results showed that there was a statistically significant difference in knowledge scores across different age groups. Specifically, participants over the age of 39 had the highest mean score, indicating that older people generally have better knowledge about how to prevent urinary stone disease. This finding is in line with the study by (Bartlo et al., 2020). Another significant difference was between males and females, with females showing a higher mean score. This means that females in this study were more knowledgeable about USD prevention, which is in line with the results reported by (Nichols et al., 2021). Lastly, there was a highly significant relationship between educational level and knowledge scores. Participants with a diploma or institute-level education had higher scores.

Age was revealed to be a statistically significant predictor of attitude with respect to USD prevention. There was a statistically significant difference between the age groups, even though the mean attitude scores were quite close. This conclusion is backed by the research of (Hajovsky et al., 2023). Participants with a diploma or institute-level education demonstrated the highest mean

attitude score, and there was a significantly significant association between educational levels and attitude scores. The findings are consistent with (Alnemari et al., 2022). Furthermore, there was a very significant correlation between occupation and perspective on urinary stone prevention. The average attitude score was highest among students, then among housewives. There was also a statistically significant correlation between attitude and location, with city dwellers displaying marginally better attitudes than their rural counterparts. In agreement with these results are (Cerina & Fornara, 2011; Ukkali et al., 2021).

In terms of practice towards urolithiasis prevention, a significant prevalence of kidney stone disease among direct relatives was reported by participants. This suggests a potential link between family history and preventive self-practice, as individuals with a family history might be more inclined to adopt preventive measures. This observation is supported by (Rasooly et al., 2023) The majority of participants reported engaging in dietary modifications, including reducing the intake of meat and animal products and limiting foods high in oxalates.

This indicates a strong relationship between awareness of dietary risk factors and self-practice, similar to findings reported by (Moon et al., 2017) Additionally, 66.9% of participants reported making lifestyle changes after receiving a KSD diagnosis, highlighting the impact of diagnosis on adopting preventive behaviors. Furthermore, 56.9% reported working in hot conditions or under the sun, indicating awareness and practice related to environmental risks, as shown in the study by (Kolb & Martin, 2017) Supplement use also varied among participants, with 43.8% taking a daily multivitamin, 53.1% using multivitamins in general, and 54.6% currently using vitamin D supplements. Notably, 66.9% reported the use of herbal remedies, findings that are in line with the study conducted by (Rother et al., 2020).

CONCLUSIONS:

Urolithiasis is a complex and prevalent disorder of the urinary system predominantly affecting working age males. Its development is influenced by a combination of metabolic factors, life style, and environmental conditions, underscoring the importance of comprehensive prevention and management strategies. Effective prevention of urinary stone recurrence requires a multifaceted approach, with an emphasis on adequate fluid intake and dietary modification tailored to the specific stone type. Moreover, addressing underling metabolic abnormalities necessary, the use of targeted pharmacological therapies are essential for long term prevention and reduction of recurrence risk.

LIMITATION:

Several factors that can impact the trustworthiness and applicability of the results are included under the study's limitations. The first is that, although 130 people is enough for the study's purposes, it might not be representative of the population at large due to differences in age, socioeconomic position, geography, and health. The results might not apply to other parts of Iraq or nations with different demographic profiles because the study only involved two hospitals in Sulaymaniyah City. Furthermore, the study's cross-sectional design limits its capacity to determine whether there is a causal association between the relevant variables, which include kidney stone prevention knowledge, attitudes, and practices. Data acquired at a single instant in time does not allow us to discern how these elements have evolved over time. The use of self-reported data to evaluate participants' knowledge, attitudes, and actions is another disadvantage. The potential for biases like recall bias or social desirability bias arises because of this. For example, participants may give answers they think would be more accepted by society, or they may not accurately recall previous actions or information. Unreliable or biased results may be the outcome of these biases.

Moreover, the study's limitations include its failure to account for confounding variables that may have an impact on kidney stone prevention, such as environmental factors, comorbidities, or genetics. In order to overcome these constraints and draw more reliable and applicable results, future research should recruit a bigger and more representative sample, employ longitudinal designs to monitor changes over time, and increase the use of objective data gathering methods.

RECOMMENDATIONS:

A longitudinal design that tracks changes over time and includes a bigger, more varied sample should be used in future research. Prioritizing objective data collection approaches can help decrease biases. There must be public health campaigns in high-risk communities that emphasize the need of staying hydrated, eating right, and making other lifestyle adjustments. If healthcare providers are serious about improving kidney stone therapy in the long run and preventing recurrence, they should make patient education a priority.

ETHICAL CONSIDERATIONS:

Ethical approval was obtained from the ethics committee of the College of Nursing. University of Sulaimani. The participants were informed of the research's objective and assured of the anonymity and confidentiality of their information. Informed consent for volunteer participation was acquired in writing from each participant.

FINDING:

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AUTHORS' CONTRIBUTIONS:

Study concept, writing, reviewing the final edition by all authors.

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The authors report no conflict of interest.

REFERENCES:

Adawi, E., Mahzara, N. K., Hadaddi, R., Ageeli, S., Altubayqi, T., Moafa, E., Althurwi, S., Hakami, A. A., Qahtani, R., Kariri, A. M., Jafar, S., Kobal, T., & Alqaari, R. (2023). Awareness of Urinary Stone Risk Factors Among the Adult Population of Jazan, Saudi Arabia: A Cross-Sectional Study. *Cureus*. https://doi.org/10.7759/cureus.49115.

Alnemari, W., Bakry, S., Saati, B., AL-Zahrani, S., Alsufyani, A., Nouman, W., Ujaimi, M., Bakry, S., Alqurashi, M., Alharbi, M., Alwezainani, M., & Elhefny, M. (2022). Perception and attitude of medical and paramedical students of Umm Al-Qura University regarding urolithiasis: a crosssectional study. **International Journal of Medicine in Developing Countries**, 1436–1441. https://doi.org/10.24911/ijmdc.51-1661261259.

Alshubaili, A. M., Alotaibi, A. F., Alsaleh, K. A., Almogarri, A. I., Alanizi, A. A., Alsaif, S. S., Alghamdi, A. S., Alnazari, N. M., & Almalki, A. (2024). The Prevalence of Nephrolithiasis and Associated Risk Factors Among the Population of the Riyadh Province, Saudi Arabia. *Cureus*. https://doi.org/10.7759/cureus.55870.

Bartlo, P., Irion, G., & Voorhees, J. (2020). Assessment of the Knowledge Level Regarding Cardiovascular Disease Risk Factors: Comparison Across Age Groups. *Journal of Community Health*, 45(5), 1030–1037. https://doi.org/10.1007/s10900-020-00824-w.

Basiri, A., Kashi, A. H., Zahir, M., Borumandnia, N., Taheri, M., Golshan, S., Narouie, B., & Mombeini, H. (2024). Predictors of Recurrent Urolithiasis in Iran: Findings from a Nationwide Study. *Archives of Iranian Medicine*, 27(4), 200–205. https://doi.org/10.34172/aim.2024.29.

Bayne, D., Srirangapatanam, S., Hicks, C. R., Armas-Phan, M., Showen, A., Suskind, A., Seligman, H., Bibbins-Domingo, K., Stoller, M., & Chi, T. L. (2022). Community Income, Healthy Food Access, and Repeat Surgery for Kidney Stones. *Urology*, 160, 51–59. https://doi.org/10.1016/j.urology.2021.11.010.

Cerina, V., & Fornara, F. (2011). The psychological determinants of attitudes toward relocation in the elderly: A survey study in urban and rural environments.

Chen, T., Jiang, Y., Zhang, P., Wang, F., Chen, B., & Yu, D. (2024). Knowledge, attitude, and practice regarding stone formation and recurrence among urolithiasis patients: a cross-sectional study. *Scientific Reports*, 14(1), 28408. https://doi.org/10.1038/s41598-024-80078-x.

Delbari, A., Farrokhi, M., Mehri, A., Saberian, M., Sadri, M., & Saatchi, M. (2025). Prevalence and Factors Associated with Kidney Stones in the Elderly Iranian Population: Findings from the Ardakan Cohort Study on Aging (ACSA). *Archives of Iranian Medicine*, 28(2), 73–80. https://doi.org/10.34172/aim.33337.

Dhondup, T., Kittanamongkolchai, W., Vaughan, L. E., Mehta, R. A., Chhina, J. K., Enders, F. T., Hickson, L. T. J., Lieske, J. C., & Rule, A. D. (2018). Risk of ESRD and Mortality in Kidney and Bladder Stone Formers. *American Journal of Kidney Diseases*, 72(6), 790–797. https://doi.org/10.1053/j.ajkd.2018.06.012.

Ellison, J. S., & Tasian, G. E. (2021). The Impact of Sex and Gender on Clinical Care and Research Design in Nephrolithiasis. *Urology*, 151, 54–57. https://doi.org/10.1016/j.urology.2020.04.089.

Ezer, M., Güzel, R., Uslu, M., Güven, S., & Sarica, K. (2024). Clinical characteristics of adult cases with urolithiasis from Turkey: A regional epidemiological study. *Archivio Italiano Di Urologia e Andrologia*, 96(1). https://doi.org/10.4081/aiua.2024.12181.

Fadhil, Y. S. (2022). study on renal stones incidence with regard to age, gender and chemical composition of stones in Western Iraq. *International Journal of Health Sciences*, 9814–9818. https://doi.org/10.53730/ijhs.v6ns1.7291.

Hajovsky, D. B., Niileksela, C. R., Olsen, S. C., & Sekula, M. K. (2023). Do Cognitive–Achievement Relations Vary by General Ability Level? *Journal of Intelligence*, 11(9). https://doi.org/10.3390/jintelligence11090177.

Ismael, N. (2021). Patient's Awareness Regarding Prevention of Recurrent Urinary Tract Stones in Surgical Teaching Hospital in Sulaimani City, Iraq. *Journal of Zankoy Sulaimani* - Part A, 23(1), 17–26. https://doi.org/10.17656/jzs.10837.

Jehn, A. (2022). The relationship between postsecondary education and adult health behaviors. SSM - *Population Health*, 17. https://doi.org/10.1016/j.ssmph.2021.100992.

Kolb, H., & Martin, S. (2017). Environmental/lifestyle factors in the pathogenesis and prevention of type 2 diabetes. In BMC Medicine (Vol. 15, Issue 1). *BioMed Central Ltd*. https://doi.org/10.1186/s12916-017-0901-x.

Lotan, Y., Antonelli, J., Jiménez, I. B., Gharbi, H., Herring, R., Beaver, A., Dennis, A., Von Merveldt, D., Carter, S., Cohen, A., Poindexter, J., Moe, O. W., & Pearle, M. S. (2017). The kidney stone and increased water intake trial in steel workers: results from a pilot study. *Urolithiasis*, 45(2), 177–183. https://doi.org/10.1007/s00240-016-0892-7.

Lv, D., Tang, L., Chen, Y., Wang, R., Liu, L., Jian, N., Zhang, T., & Shen, T. (2024). Knowledge, attitudes, and practices towards urinary system stones among the Chengdu population. *Scientific Reports*, 14(1). https://doi.org/10.1038/s41598-024-60227-y.

Moftakhar, L., Jafari, F., Ghoddusi Johari, M., Rezaeianzadeh, R., Hosseini, S. V., & Rezaianzadeh, A. (2022). Prevalence and risk factors of kidney stone disease in population aged 40–70 years old in Kharameh cohort study: a cross-sectional population-based study in southern Iran. *BMC Urology*, 22(1). https://doi.org/10.1186/s12894-022-01161-x.

Moon, J. H., Roh, E., Oh, T. J., Kim, K. M., Moon, J. H., Lim, S., Jang, H. C., & Choi, S. H. (2017). Increased risk of metabolic disorders in healthy young adults with family history of diabetes: from the Korea National Health and Nutrition Survey. *Diabetology and Metabolic Syndrome*, 9(1). https://doi.org/10.1186/s13098-017-0210-8.

Moudi, E., Hosseini, S. R., & Bijani, A. (2017). Nephrolithiasis in elderly population; effect of

demographic characteristics. *Journal of Nephropathology*, 6(2), 63–68. https://doi.org/10.15171/jnp.2017.11.

Nichols, E. S., Wild, C. J., Owen, A. M., & Soddu, A. (2021). Cognition across the lifespan: Investigating age, sex, and other sociodemographic influences. *Behavioral Sciences*, 11(4). https://doi.org/10.3390/bs11040051.

Patel, S. R., Futral, C., Miller, C. A., Bose, R., Kearns, J., Clark, P. E., & Roy, O. P. (2021). Demographic and Socioeconomic Factors Associated with Urinary Stone Disease Management in a Large Urban US Population. *Urology*, 153, 93–100. https://doi.org/10.1016/j.urology.2021.01.036.

Rasooly, D., Moonesinghe, R., Littrell, K., Hull, L., & Khoury, M. J. (2023). Association Between a First-Degree Family History and Self-Reported Personal History of Obesity, Diabetes, and Heart and Blood Conditions: Results From the All of Us Research Program. *Journal of the American Heart Association*, 12(22). https://doi.org/10.1161/JAHA.123.030779.

Rother, H. A., John, J., Wright, C. Y., Irlam, J., Oosthuizen, R., & Garland, R. M. (2020). Perceptions of occupational heat, sun exposure, and health risk prevention: A qualitative study of forestry workers in South Africa. *Atmosphere*, 11(1). https://doi.org/10.3390/ATMOS11010037.

Setyawan, H., Pratiwi, Q. C., Sjarifah, I., Atmojo, T. B., & Khotijah. (2018). Environmental heat stress enhances crystallization in urine. *IOP Conference Series: Earth and Environmental Science*, 129(1). https://doi.org/10.1088/1755-1315/129/1/012035.

Shoag, J., Tasian, G. E., Goldfarb, D. S., & Eisner, B. H. (2015). The New Epidemiology of Nephrolithiasis. In Advances in Chronic Kidney Disease (Vol. 22, Issue 4, pp. 273–278). *W.B. Saunders*. https://doi.org/10.1053/j.ackd.2015.04.004.

Sohgaura, A., & Bigoniya, P. (2017). A Review on Epidemiology and Etiology of Renal Stone. *American Journal of Drug Discovery and Development*, 7(2), 54–62. https://doi.org/10.3923/ajdd.2017.54.62.

Sowtali, S. N., Mohamed Faizal, N. F. F., & Baharudin, A. S. (2022). Knowledge, Awareness and Practice on Dietary Management Among Patients with Urolithiasis: A Scoping Review. *INTERNATIONAL JOURNAL OF CARE SCHOLARS*, 5(2), 126–132. https://doi.org/10.31436/ijcs.v5i2.252.

Stern, K. L., Gao, T., Antonelli, J. A., Viprakasit, D. P., Averch, T. D., Chi, T., Chew, B. H., Bird, V. G., Pais, V. M., Streeper, N. M., Sur, R. L., Nakada, S. Y., Penniston, K. L., & Sivalingam, S. (2019). Association of Patient Age and Gender with Kidney Stone Related Quality of Life. *Journal of Urology*, 202(2), 309–313. https://doi.org/10.1097/JU.0000000000000291.

Sun, H., Wang, X., Zhang, X., Wang, L., Tao, M., Wang, Y., Yang, J., Lei, Y., Jin, C., Zhao, S., Hu, Y., & Hu, H. (2023). High ambient temperature increases the number of emergency visits for upper urolithiasis in Hefei City, China. *Heliyon*, 9(1). https://doi.org/10.1016/j.heliyon.2023.e12856.

Takeuchi, H., & Aoyagi, T. (2019). Clinical characteristics in urolithiasis formation according to body mass index. *Biomedical Reports*, 11(1), 38–42. https://doi.org/10.3892/br.2019.1220.

Türk, C., Petřík, A., Sarica, K., Seitz, C., Skolarikos, A., Straub, M., & Knoll, T. (2016). EAU Guidelines on Diagnosis and Conservative Management of Urolithiasis. *European Urology*, 69(3), 468–474. https://doi.org/10.1016/j.eururo.2015.07.040.

Ukkali, S. B., Kulkarni, N., A.N., T., Siddiqua, A., & Reddy, S. (2021). Comparative Study of Attitude of Adolescents Studying in Junior Colleges of Rural and Urban Areas of Vijayapura towards Social Aspects of Life. *Journal of Evolution of Medical and Dental Sciences*, 10(18), 1280–1285. https://doi.org/10.14260/jemds/2021/271.

Wang, K., Ge, J., Han, W., Wang, D., Zhao, Y., Shen, Y., Chen, J., Chen, D., Wu, J., Shen, N., Zhu, S., Xue, B., & Xu, X. (2022). Risk factors for kidney stone disease recurrence: a comprehensive meta-analysis. *BMC Urology*, 22(1). https://doi.org/10.1186/s12894-022-01017-4.

Yoshimura, E., Sawada, S. S., Lee, I. M., Gando, Y., Kamada, M., Matsushita, M., Kawakami, R., Ando, R., Okamoto, T., Tsukamoto, K., Miyachi, M., & Blair, S. N. (2016). Body mass index and kidney stones: A cohort study of Japanese men. *Journal of Epidemiology*, 26(3), 131–136. https://doi.org/10.2188/jea.JE20150049.

Yuri, P., Hariwibowo, R., Soeroharjo, I., Danarto, R., Hendri, A. Z., Brodjonegoro, S. R., Rasyid, N., Birowo, P., & Widyahening, I. S. (2018). Meta-analysis of Optimal Management of Lower Pole Stone of 10-20 mm: Flexible Ureteroscopy (FURS) versus Extracorporeal Shock Wave Lithotripsy (ESWL) versus Percutaneus Nephrolithotomy (PCNL). *In Acta Med Indones-Indones J Intern Med* • (Vol. 50).

Zhang, Y., Long, G., Ding, B., Sun, G., Ouyang, W., Liu, M., Ye, Z., Xu, H., & Li, H. (2020). The impact of ambient temperature on the incidence of urolithiasis: A systematic review and meta-analysis. In Scandinavian Journal of Work, Environment and Health (Vol. 46, Issue 2, pp. 117–126). *Nordic Association of Occupational Safety and Health*. https://doi.org/10.5271/sjweh.3866.

TABLES:

Table (1): Distribution of participant according to socio-demographic characteristics.

Variables (N=130)		Frequency	Percentage
Age groups	19-29 years	18	13.8
	30-39 years	39	30.0
	More than 39 years	73	56.2
Mean± SD 42.4±12.4	**Median= 42.0**		
Gender	Male	89	68.5
	Female	41	31.5
Education levels	Couldn't read and write	13	10.0
	Primary school	35	26.9
	Secondary school	46	35.4
	Diploma or institute	14	10.8
	College and above	22	16.9
Occupation	Student	5	3.8
	Housewife	30	23.1
	Employed	30	23.1
	Self-employed	32	24.6
	Jobless	27	20.8
	Retired	6	4.6
Place of residence	urban	73	56.2
	suburban	46	35.4
	rural	11	8.5
Marital status	Single	24	18.5
	Married	102	78.5
	Separated/ divorced	4	3.1
Financial status	Sufficient	28	21.5
	Barely sufficient	63	48.5
	Insufficient	39	30.0
Body Mass Index	Underweight (less than 18.5)	2	1.5
	Normal (18.5-24.9)	33	25.4
	Obese (25-29.9)	67	51.5

	Overweight (≥ 30)		28	21.5
	Scores	Minimum 17.3	Maximum 39.18	Mean ± SD
			27.4±3.94	

Table (2): The relation between knowledge, attitude ,and practice regarding prevention of urinary stone disease and sociodemographic among study participants

Socio-demographic characteristics		N.	Knowledge		Attitude		Practice	
			Score	P-value	Score	P-value	Score	P-value
Age groups	19-39 years	18	15.6±4.23	0.047	18.6±4.44	0.000	7.72±2.56	0.000
	30-39 years	39	15.8±4.05	Sig	18.8±3.39	H. Sig	7.97±2.07	H. Sig
	More than 39 years	73	18.0±5.05		17.9±3.82		7.82±2.19	
Gender	Male	89	16.3±4.71	0.044	18.3±3.84	0.000	7.77±2.14	0.000
	Female	41	18.6±4.58	Sig	18.3±3.70	H. Sig	8.02±2.31	H. Sig
Educational levels	Couldn't read and write	13	18.7±3.60	0.000	16.5±3.50	0.000	7.15±2.03	0.000
	Primary school	36	16.6±3.86	H. Sig	18.5±3.13	H. Sig	7.55±2.11	H. Sig
	Secondary school	46	15.1±4.65		18.3±3.75		7.78±2.47	
	Diploma or institute	14	19.4±5.45		19.3±5.30		8.14±2.38	
	College and above	21	19.1±5.10		18.4±3.88		8.76±1.37	
Occupation	Student	5	14.2±2.94	0.000	18.8±4.02	0.000	7.40±2.88	0.000
	Housewife	30	17.9±4.38	H. Sig	18.7±3.58	H. Sig	8.26±2.37	H. Sig
	Employed	30	16.2±5.31		18.4±3.56		7.70±2.53	
	Self-employed	32	16.7±4.58		18.2±3.7		7.87±1.73	
	Jobless	27	17.0±4.64		18.1±4.27		7.62±2.27	
	Retired	6	20.0±5.96		16.5±4.50		7.83±0.75	
Place of residency	Urban	72	17.3±5.43	0.350	18.4±3.77	0.000	8.20±2.08	0.001
	Suburban	47	16.6±3.78	N. Sig	18.4±4.04	H. Sig	7.40±2.43	Sig
	Rural	11	16.7±4.07		17.4±2.84		7.45±1.75	
Marital status	Single	24	16.4±4.55	0.199	18.3±4.13	0.367	7.45±2.08	0.444
	Married	102	17.3±4.84	N. Sig	18.4±3.74	N. Sig	8.00±2.09	N. Sig
	Separated/ divorced	4	14.0±3.55		15.7±2.84		6.50±4.65	
Financial status	Sufficient	29	18.8±5.64	0.021	17.5±3.44	0.107	7.68±2.13	0.010
	Barely sufficient	62	16.5±4.18	Sig	18.8±3.57	N. Sig	7.74±2.42	Sig
	Insufficient	39	16.4±4.75		18.0±4.30		8.15±1.84	

Table (3): Distribution of knowledge, attitude and self-practice scores among study participants

Variables N=(130)	Scores	Frequency (F)	Percentage (%)
Knowledge of prevention of urinary stone disease	Poor	47	36.2
	Fair	44	33.8
	Good	39	30.0
Attitude toward prevention of urinary stone disease	Poor	50	38.5
	Fair	40	30.8
	Good	40	30.8
Self- Practice toward prevention of urinary stone disease	Poor	49	37.7
	Fair	52	40.0
	Good	29	22.3

Table (4): Correlation analysis among knowledge, attitude and practice among study participants

Variables N=(130)		Knowledge	Attitude	Self-Practice
Knowledge	Pearson Correlation	1	-0.163	0.304
	p-value	-----	0.064	0.000
			N-Sig	H. Sig
Attitude	Pearson Correlation	-0.163	1	0.127
	p-value	0.064	------	0.151
		N. Sig		N. Sig
Self- Practice	Pearson Correlation	0.304	0.127	1
	p-value	0.000	0.151	------
		H. Sig	N. Sig	

Table (5): Structure equation models among knowledge, attitude and practice among study participants

Variables N=(130)	Estimate	S.E	C.R	P. value
Attitude ←Knowledge	0.129	0.069	49.104	0.000
				H. Sig
Practice ←Attitude	0.219	0.151	29.786	0.000
				H. Sig
Practice ←Knowledge	0.140	0.039	57.427	0.000
				H. Sig