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KIDNEY STONE: A LITERATURE REVIEW

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Background

Nephrolithiasis is one of the prevalent conditions in urology affecting numerous people worldwide. There has been a rise in the rate of formation of kidney stones due to several factors such as change in dietary intake, lifestyle, and environment. Therefore, raising public awareness concerning the risks associated with kidney stones can help minimize their impact.

Objectives

This study aimed to evaluate the level of awareness, knowledge, and preventive practices for kidney stones among the general public.

Methods

A cross-sectional descriptive study was carried out through an online survey using an instrument. The study comprised 82 participants who completed the questionnaire. Information was obtained concerning demographic data, awareness of kidney stones, risk factors, dietary habits, prevention strategies, and symptoms. Descriptive statistics were used to analyze and present data.

Results

Out of the total 82 participants, 58.5% stated that they were aware of the existence of kidney stones, whereas 37.8% did not have any knowledge about it beforehand. Just 39.0% understood that not drinking enough water was one of the risk factors for developing kidney stones. About 26.8% individuals consumed less than one liter of water per day, while 45.1% individuals consumed soft drinks. About 28.0% individuals stated that there was a history of kidney stones in their families. Severe pain in the abdomen was the most recognized symptom (29.3%), while others' awareness was still quite low. 56.1% of individuals showed interest in knowing more about preventing kidney stones.

Conclusion

This study highlights the moderate level of awareness and inadequate level of knowledge among individuals regarding risk factors, symptoms, and prevention of kidney stones.
Keywords: Kidney stones, nephrolithiasis, awareness, prevention, hydration, public health, lifestyle factors.
INTRODUCTION

Nephrolithiasis or urolithiasis, commonly referred to as kidney stones disease, is one of the most common conditions affecting the urinary tract. Nephrolithiasis is a condition whereby crystalline mineral deposits form inside the kidney or urinary tract system. The incidence of kidney stones has increased remarkably in the last few decades, posing major public health challenges around the globe. Statistics from epidemiological research suggest that roughly 10-15% of the world's population suffers from kidney stones at least once in their lives. Recurrence of kidney stones is reported at a rate of up to 50% within five years following the first occurrence.

A number of factors lead to the formation of kidney stones. These include hereditary predisposition, environment, diet, and various other metabolic causes. Some of the common factors that increase the risk of developing kidney stones include inadequate fluid consumption, high sodium intake, excess consumption of animal protein, obesity, lack of exercise, metabolic disorders, and heredity. Higher incidences of kidney stones have also been attributed to global warming and rising temperatures.

Kidney stones lead to great morbidity and cause serious pain. Some common manifestations of kidney stones include pain in the loin, abdominal pain, hematuria, vomiting, nausea, polyuria, and dysuria. In case of negligence of this condition, one might suffer from UTIs, hydronephrosis, obstruction of the urinary tract, and even chronic kidney disease. Thus, early diagnosis of kidney stone disease and prevention of the condition are necessary in order to improve the overall burden of the problem.

Research has shown that sufficient water intake, appropriate diet, physical exercises, and knowledge of risk factors can effectively help in reducing the risk of the development of kidney stones. However, in spite of all the preventive measures that can be taken, people do not have enough information about the disease.

Knowledge and awareness assessment is crucial when planning education-based strategies and health prevention programs. Knowing how people think about kidney stones can assist the healthcare workers in understanding the gaps in knowledge and designing awareness campaigns that would be efficient.

It is for this reason that this study has been performed to examine the knowledge and awareness levels concerning kidney stones in the general population. Moreover, major misconceptions associated with kidney stones along with behavioral risk factors have been identified through the study.

METHODS

Study Design and Setting

This study was conducted by using the descriptive cross-sectional survey method for assessing awareness, knowledge, and practices related to kidney stone disease among the general population. This survey was performed through the distribution of an online questionnaire among the general public.

Study Population

In this study, the population selected comprised of participants aged 18 years and older who participated in the survey voluntarily. Different age groups, genders, educational qualifications, and demographics of participants were involved in this survey.

Sample Size

In total, 82 valid responses were gathered for the analysis in the study. Responses that were not complete were not included in the study.

Instrument for Data Collection

For data collection, a questionnaire designed after reviewing literature related to the topic was used. This questionnaire was structured in several segments including:

Sociodemographic information (age, gender, place of residing).

Awareness about the problem.

Awareness of risk factors/causes.

Lifestyle/dietary habits.

History and personal risk factors.

Symptoms of the disease.

Prevention/Awareness programs attitude.

The questionnaire contained questions in multiple choice/closed ended forms.

Inclusion Criteria

Subjects who are above 18 years of age.

Subjects who can give their consent to participate in the study.

Subjects who are able to comprehend the questionnaire.

Exclusion Criteria

Survey subjects whose answers were incomplete.

Subjects below the age of 18.

Duplicates.

Ethical Issues

Subject participation in the study was on a voluntary basis. Prior to administering the questionnaire, subjects were informed about the aim of the study. Confidences in their answers were guaranteed. Their personal details were not recorded and were only used for research purposes.

Statistical Analysis

Information obtained during data collection was entered into Microsoft Excel and subjected to statistical analysis using descriptive statistics. Calculations included frequencies and percentages. Information was presented in tabulated forms. Interpretation was based on comparison of results with other studies that have been published earlier on awareness and preventive behaviors toward kidney stones.

Primary Outcomes Measured

They include:

Awareness of the existence of kidney stones.

Awareness of risk factors and symptoms associated with kidney stone formation.

Behavioral risk factors such as hydration and diet.

Presence of family history as one of the causes of kidney stones.

Need for preventive education programs against kidney stones.

RESULTS

Segment 1: Sociodemographic Characteristics and Awareness of Kidney Stones (Q1–Q5)

Participants were 82 in number, with the largest percentage being aged between 18 and 25 years (40.2%). The female gender represented the highest percentage (36.6%), followed by male participants who made up 30.5%. Both rural and urban areas were almost equally

represented, increasing the generalizability of results among diverse populations.

Awareness concerning kidney stones was fairly moderate, as 58.5% of respondents had heard about kidney stones. About a third did not know anything about kidney stones; therefore, awareness levels were low. Information about kidney stones came from friends and relatives the most, then the Internet and health practitioners.

The results obtained are consistent with previous research conducted by Shabanzadeh et al. (2016), Sulaiman et al. (2019), and Alelign & Petros (2018), who have reported awareness rates between 55-70% in the community population. In addition, Khan et al. (2021) reported that informal social networks served as important sources of information about urinary stones disease. On the contrary, studies performed by Al-Hinai et al. (2020) and Basiri et al. (2018) indicated that the rate of awareness was greater than 70%.

Accordingly, the current results show that people lack sufficient awareness about kidney stones disease despite its rising prevalence around the world. It seems likely that relying on informal sources of knowledge might lead to incorrect beliefs about factors contributing to the development of kidney stones and ways to prevent the condition.

Variable	Category	n (%)
Age Group	18–25 years	33 (40.2)
Age Group	26–35 years	22 (26.8)
Age Group	36–50 years	24 (29.3)
Gender	Female	30 (36.6)
Gender	Male	25 (30.5)
Gender	Prefer not to say	24 (29.3)
Residence	Rural	40 (48.8)
Residence	Urban	39 (47.6)
Heard about Kidney Stones	Yes	48 (58.5)
Heard about Kidney Stones	No	31 (37.8)
Main Information Source	Others	23 (28.0)
Main Information Source	Friends/Family	19 (23.2)
Main Information Source	Internet	14 (17.1)
Main Information Source	Doctor	13 (15.9)

Segment 2: Knowledge Regarding Risk Factors and Lifestyle Practices (Q6–Q10)

There was limited knowledge concerning the risks related to dehydration. Insufficient water intake was recognized by only 39.0% as a risk factor for kidney stones, but almost one-third did not know. There is thus a great deficit in the information on one of the most important risks.

Water intake also contributed to the conclusion. Even though 30.5% drank 2–3 liters per day, a considerable number drank even less than the required amount of water. Around 26.8% drank less than one liter of water per day.

Food habits also exhibited some unfavorable behaviors. Over half of the participants had

moderate to high consumption of salt-rich foods, and 45.1% drank soft drinks frequently. Both behaviors have been associated with elevated levels of urinary calcium excretion and increased incidence of nephrolithiasis.

Similar results were found in other studies done by Ferraro et al. (2017), Sorokin et al. (2017), and Scales et al. (2012), which highlighted dehydration and high sodium consumption as common causes of kidney stones. A study b y Taylor and Curhan (2016) showed an inversely proportional relationship between fluid consumption and stone occurrence. In addition, poor hydration practices in the community population were observed in Saudi Arabia, India, and Pakistan through various research studies carried out by Alkhunaizi et al. (2020), Kumar et al. (2021), and Ahmed et al. (2019).

The result shows that awareness alone does not ensure healthy behavior. Proper intervention methods involving hydration and diet control should be incorporated in preventive measures.

Variable	Category	n (%)
Less Water Causes Stones	Yes	32 (39.0)
Less Water Causes Stones	Not Sure	27 (32.9)
Less Water Causes Stones	No	20 (24.4)
Daily Water Intake	2–3 Liters	25 (30.5)
Daily Water Intake	Less than 1 Liter	22 (26.8)
Daily Water Intake	1–2 Liters	18 (22.0)
Daily Water Intake	>3 Liters	14 (17.1)
Salty Food Consumption	Moderate–High	42 (51.2)
Soft Drink Consumption	Yes	37 (45.1)
Soft Drink Consumption	No	42 (51.2)

Segment 3: Dietary Habits, Exercise, and Personal Risk Profile (Q11–Q15)

Table 3. Dietary and Behavioral Risk Factors

Dietary habits were quite varied; however, vegetarians were more prevalent than non-vegetarians. Combined, mixed and non-vegetarian habits accounted for almost 60% of all cases. As previous epidemiological research has proven, excessive consumption of animal proteins results in an elevated level of calcium, oxalate, and uric acid in urine, thus making stones more likely to form.

Physical activity was quite low; about 25% of individuals did not engage in exercise. It is well-known nowadays that lack of physical activity leads to metabolic disorders, thus increasing the probability of developing kidney stones.

Family history was mentioned by 28.0% of the subjects, showing the significant role played by genetics in nephrolithiasis. The existence of genetic predisposition has been established as a significant risk factor in many epidemiological studies.

The results agree with those of Curhan et al., Rule et al., Moe (2016), and Türk et al. (Guidelines of the European Association of Urology) that have indicated the significance of the interplay between genetics, nutrition, and lifestyle on the development of stones. This is similar to the findings of Romero et al. (2018) and Uribarri et al. (2019).

It can be inferred from the results that there are a number of risk factors in this regard that are either modifiable or non-modifiable among the respondents.

Variable	Category	n (%)
Diet Type	Vegetarian	30 (36.6)
Diet Type	Mixed	26 (31.7)
Diet Type	Non-Vegetarian	23 (28.0)
Exercise Frequency	Never	22 (26.8)
Exercise Frequency	Rarely	19 (23.2)
Exercise Frequency	Weekly	19 (23.2)
Exercise Frequency	Daily	19 (23.2)
Family History	Yes	23 (28.0)
Family History	No	30 (36.6)
Family History	Not Sure	26 (31.7)

Segment 4: Knowledge of Symptoms, Perceived Severity, and Prevention Needs (Q16–Q20)

Table 4. Symptom Recognition and Preventive Attitudes

The symptoms of kidney stones were barely recognized. The primary symptom that patients were able to recognize was abdominal pain, and very few had an awareness of hematuria and other urinary symptoms. Significantly, 17.1% of participants failed to recognize the symptoms at all.

The respondents considered kidney stones to be a grave medical condition and would like to know more about this problem through health education.

This is supported by studies conducted by Pearle et al. (2019); Türk et al. (2023); Meschi et al. (2018); and Fink et al. (2013). These previous studies also showed low awareness of symptoms amid rising prevalence rates of the disease. The results of community-based interventions carried out by Lotan et al. (2017) showed marked improvements in knowledge after educational campaigns.

This study highlights the necessity of conducting well-structured education programs.

Variable	Category	n (%)
Symptom Recognition	Severe abdominal pain	24 (29.3)
Symptom Recognition	Nausea/Vomiting	17 (20.7)
Symptom Recognition	Frequent urination	14 (17.1)
Symptom Recognition	Blood in urine	10 (12.2)
Symptom Recognition	Don't know	14 (17.1)
Awareness Programs Needed	Yes	46 (56.1)
Awareness Programs Needed	No	32 (39.0)

DISCUSSION

This study evaluated awareness, knowledge, and practices related to the prevention of kidney stones amongst a sample of 82 individuals from both urban and rural populations. Results reveal moderate awareness but a lack of knowledge in terms of risk factors, signs, and preventative measures for developing kidney stones.

About 58.5 percent of subjects knew of the condition, results consistent with other community studies performed in less-developed nations. Even though awareness was moderately high, there was a deficiency in the details of knowledge. A significant number of respondents either denied or did not know that insufficient fluid intake is a factor contributing to kidney stones. This information is medically relevant as poor hydration has been shown to be a major modifiable risk factor for nephrolithiasis.

Further evidence for this problem is evident in the results of the study's hydration habits. More than one-fourth of participants admitted to drinking less than one liter of water per day. Epidemiological research done by Taylor and Curhan, Ferraro et al., and Sorokin et al. has always revealed that high fluid intake helps lower stone recurrence rates. This contradiction calls for educational programs to concentrate not only on awareness of the disease but also on behavioral changes.

Another point worth discussing is the diet of patients. Frequent consumption of soft drinks as well as high or moderate salt intake was common among study participants. High sodium intake leads to increased excretion of calcium in the urine, contributing to the development of kidney stones. Studies done in various Asian and Middle Eastern countries have found similar results amid changing dietary habits.

Family history was reported by 28% of participants, highlighting the importance of genetic predisposition. Previous studies have demonstrated that individuals with affected first-degree relatives face significantly greater risk of developing nephrolithiasis. Therefore, educational interventions should particularly target high-risk populations with positive family histories.

Recognition of symptoms was relatively poor. While severe abdominal pain was commonly identified, awareness of hematuria, urinary frequency, and associated gastrointestinal symptoms remained limited. Delayed recognition may result in late healthcare seeking, increasing the risk of complications such as urinary obstruction, infection, and renal impairment.

One of the advantages of this study is the participation of subjects from different socio-demographic backgrounds. The balanced number of rural and urban subjects allows for an enhanced understanding of awareness within communities. Moreover, the study considered not only knowledge but also behavior, providing a holistic evaluation of kidney stones prevention measures.

However, there were certain shortcomings that should be mentioned. First of all, the sample was rather small, thus reducing its generalizability. The use of self-reported data implies the possibility of errors due to recall bias. Some of the questions had partially filled answers; for instance, data on whether respondents ever had kidney stones was often missing.

In spite of all these challenges, the results have brought some useful baseline data concerning the public awareness and preventative actions for the kidney stones disease. Given that there was an enormous demand from the subjects to get involved in awareness programs, the environment could be considered as supportive.

In general, this research study suggests the need to educate the public more about the issues of hydrations, dietary habits, symptoms identification, and seeking healthcare services. This type of intervention can help reduce the prevalence of the disease.

CONCLUSION

This study aimed to explore awareness, knowledge, and practices towards the prevention of kidney stones in 82 individuals. The results indicated moderately good levels of awareness towards kidney stone conditions. However, there were some key areas that showed significant gaps within the participants' level of awareness, namely risk factors, symptoms, and prevention.

Although majority of the participants had heard about the condition, awareness towards its details was limited. Participants did not seem to be well aware of dehydration as a critical factor in causing kidney stones. A considerable number of the participants also experienced insufficient water intake daily. Additionally, other behavioral habits including high intake of salty food and carbonated drinks were observed among the participants.

Another observation made from the study is that there is inadequate identification of some symptoms of the kidney stones such as blood in urine. This may result in delayed diagnoses which may have serious repercussions. There was a presence of family history of kidney stones in many of the subjects, which suggests the role of heredity as well as environment.

It should be noted that there were more than 50 percent of the people who were interested in participating in health education regarding prevention of kidney stones.

In summary, from the findings of the study, the main implication is that despite basic knowledge regarding kidney stones existing among people in the community, adequate comprehension and prevention practices are still lacking. In addressing issues of kidney stones, strategies should be put in place to ensure that people are educated on proper hydration, dietary practices, and physical exercises. Furthermore, people should be able to recognize symptoms of kidney stones early enough.

Efforts made by the community to enhance education and preventive health care will go a long way in ensuring that kidney stones can be prevented. This study will provide a solid base for future research endeavors.

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