Section: Public Health

Original Research Article

LEVEL OF LITERACY OF URINARY STONE DISEASE AND FACTORS ASSOCIATED WITH IT AMONGST THE ADULTS OF THE UNITED ARAB EMIRATES

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ABSTRACT

Background: The objective of the study was to determine the level of literacy of urinary stone disease and factors associated with literacy among adults in the United Arab Emirates.

Materials and Methods: This cross-sectional study was conducted amongst the residents of the United Arab Emirates. After obtaining informed consent, data were collected using a self-administered questionnaire from participants who met the inclusion criteria, which included 18 years of age and above, of any gender, nationality, and willingness to participate. The gathered data were analyzed using SPSS version 28. Descriptive and inferential statistics were performed, and p value was set 0.05 for statistical significance.

Results: This research involved the participation of 3588 adults. Furthermore, 45.6% exhibited a good level of literacy about the treatment and management of urinary stone disease. And 55.1% had a good knowledge about the complications related to urinary stone disease. The factors associated with the level of good literacy were history of urinary tract infection (UTI), family history of urinary stone disease, employment status and adequate water consumption daily.

Conclusion: The findings indicate a good level of literacy among participants regarding risk factors, management, and prevention of urinary stone disease. A significant association was seen between good levels of literacy and adults age greater than 40. In addition, employed participants, participants who experienced urinary stones or UTI exhibited good levels of literacy. Furthermore, participants with a positive family history as well as those with adequate water intake also demonstrated good levels of literacy.

Keywords: Urinary stone disease, Adults, Level of Literacy, United Arab Emirates.

INTRODUCTION

Urinary stone disease, also known as urolithiasis or kidney stones, is an illness that is characterized by the formation of stones and calcification inside the urinary system.[1] It has known to affect about 12% of the world's population.[2] The disease has a long history, with evidence of its impact dating back to 4000 BC2, and despite technical advances in the treatment of the condition, preventing the recurrence of the illness nevertheless remains a crucial concern in human health.[1] The presenting symptoms of the condition are often based on the location where the urinary stones are formed, such as the kidney, ureter, urinary bladder. The disorder frequently begins asymptomatically before progressing into painful symptoms like renal colic, resulting in severe cramping and back pain, flank discomfort, hematuria, obstructive uropathy, and urinary tract infections, all of which cause kidney hypertrophy.[2]

There have been only a few studies conducted across the globe on the level of literacy about the symptoms, risk factors and complications related to urolithiasis across the world. One of them was a study conducted amongst 1010 citizens of Hong Kong, which had highlighted the limited understanding of preventative methods regarding urinary stones.[3]

A study conducted in Saudi Arabia concluded that the level of literacy about the condition and risk factors such as dietary and lifestyle habits among the population was low, with 37.7% respondents having low levels of awareness; 35.3%, moderate; and around 0.6% having high levels of awareness of the condition.[3] Another study had also shown that native Saudis were 2.5 times higher chances of developing the condition than non-native Saudi.[4-6]

Urinary stone disease has lately received significant global attention due to the serious impact it has on people's health and cannot be disregarded.[7,8] Implementing innovative strategies to enhance community awareness and promote early screening for urinary stones can play a pivotal role in preventing disease progression and significantly reducing new cases. Additionally, greater knowledge of the signs, origins, and treatment options will aid in reducing morbidities and halting the spread of disease.[9] This research assessed the level of literacy about urinary stone diseases among adults in the United Arab Emirates and the factors associated with it. The outcome of the research findings will help healthcare professionals to understand the level of knowledge and they can strategically advise patients on preventative measures that can be taken to reduce the incidence rate of these conditions.

The implication of this research was to assess how well the targeted population in the UAE are generally aware of symptoms of urinary stones and the risk factors related to it. The study intends to fill the knowledge gap on the subject of urinary stone illness among the general audience. Additionally, it looks for typical misconceptions and potential information sources related to raising awareness of the issue. Consequently, the findings of the study aim to emphasize the importance of doctors and other healthcare providers in educating patients and increasing public knowledge to aid in early illness detection and avoid its recurrence.

Review of Literature

In recent research conducted in Malaysia, the mean awareness score at 81.23 (±9.98), signifying a notably high level of awareness regarding urolithiasis.[4]

A study carried out in Iraq on awareness among patients concerning kidney stones indicated a moderate level of awareness, with a noteworthy emphasis on fluid and beverage intake, which stood out as notably high.[5]

A research study conducted in the United Arab Emirates has revealed captivating insights into the knowledge levels of its participants regarding kidney stones. The study encompassed 500 individuals and discovered that, on average, their knowledge score reached 56.4%.[7]

Another Saudi Arabian study revealed that 22.6% of the participants were well informed about the contribution of coffee and tea to the formation of stones. This underscores the varied awareness levels across different studies regarding the relationship between urinary stone formation and the frequent consumption of tea or coffee.[11-13]

In a parallel study involving the general population of Saudi Arabia, a divergent trend emerged, underscoring a noteworthy gender-based distinction in awareness. In this scenario, females exhibited significantly higher awareness levels in comparison to males (P = 0.001), further emphasizing the variability in gender-associated awareness patterns within the broader Saudi population.[14]

In a parallel investigation within the adult demographic in the Hail region of Saudi Arabia, findings illuminated a noteworthy trend. Low awareness levels regarding urolithiasis were significantly higher among participants who were not diagnosed with urolithiasis previously than those who were (61.1% and 48.7, respectively; P = 0.001).[13]

MATERIALS AND METHODS

This is a cross-sectional study design involving adults in the United Arab Emirates. Inclusion criteria are individuals of age 18 years and above, both male and female, and residents of any nationality. Exclusion criteria include individuals unable to comprehend or read the questions, individuals who declined to participate, and those absent during data collection. The sample size was calculated by entering the respective values of the variables required in the formula: N = 4PQ/(L2), where p stands for the disease prevalence either in percentage form or decimal form and L stands for the level of precision. The value for q can be calculated by subtracting p from 100 if p is in percentage form, whereas if p is in decimal form, q can be calculated by subtracting p from 1.

A self-administered questionnaire was used to collect data from the participants after getting informed consent. Information related to demographic characteristics, questions on literacy related to risk factors, management, and prevention of urinary stone diseases. Information on previous history of urinary stones, family history of urolithiasis, and dietary and other lifestyle factors were included in the study.

The statistical package for social science (SPSS) version 28 was used to analyze the data collected. Descriptive statistics such as mean, standard deviation, frequency and percentage were used to interpret the data. Additionally, the chi-square test, which is a form of inferential statistic, was used to determine the association between dependent and independent variables. Statistical significance was defined as a p-value less than 0.05. A comprehensive analysis of the answers selected by the participants was performed to determine their level of literacy based on the number of questions correctly answered. Following this research through the help of an arbitrary classification, the percentage of correct answers above 50% was considered as a good level of knowledge, while the percentage of correct

answers below 50% was considered as a poor level of knowledge.

RESULTS

This research was conducted to assess the literacy level on urinary stone disease among adults in the United Arab Emirates. A total of 3588 adults participated in the research.

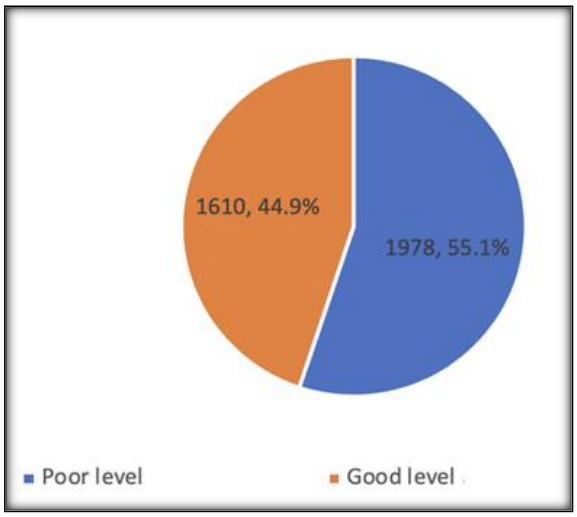

Figure 1: Distribution of participants according to level of knowledge about the complication related to urinary stone disease (N=3588)

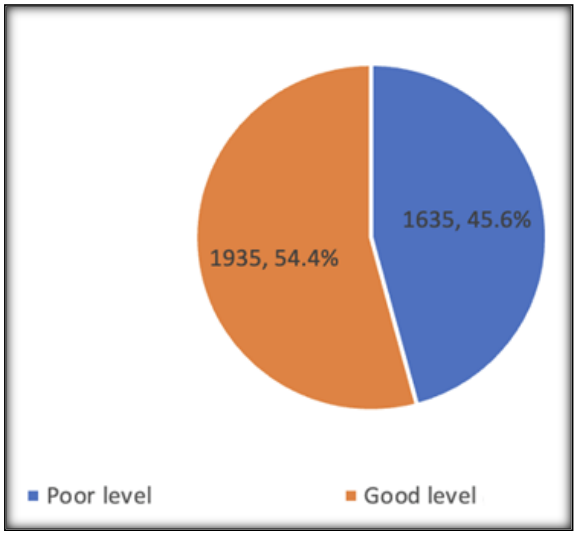

Figure 2: Distribution of participants according to level of knowledge on treatment and management of urinary stone disease (N=3588)

[Table 1] showed the association between level of literacy and sociodemographic characteristics with regards to age group and level of literacy. Among the participants in the age group less than 24, (428, 55%) had a good level of literacy. Whereas participants in the age group 25-40, (739, 51.8%) had a good level of literacy. Also, among participants older than 40 (891, 64.4%) showed good levels of literacy. As age increased, the level of literacy increased. The association observed between the age group and the level of literacy was found to be statistically significant with p value <0.001. In this current study for gender and level of literacy, (1041, 57.5%) of males had a good level of literacy as compared to females (1017, 57.2%) of females, which is statistically insignificant with p value 0.81. In regard to nationality, (1473, 55.4%) of participants from the EMR region had a good level of literacy but relatively less as compared to the remaining (582, 62.9%) from other nationalities. The association observed between nationality and level of literacy with a p value <0.001 was statistically significant. Among the employed participants (1609, 59.5%) of them had a good level of literacy as compared to (449, 50.8%) of the unemployed participants. The association between employment status and level of literacy was found to be statistically significant with a p value <0.001.

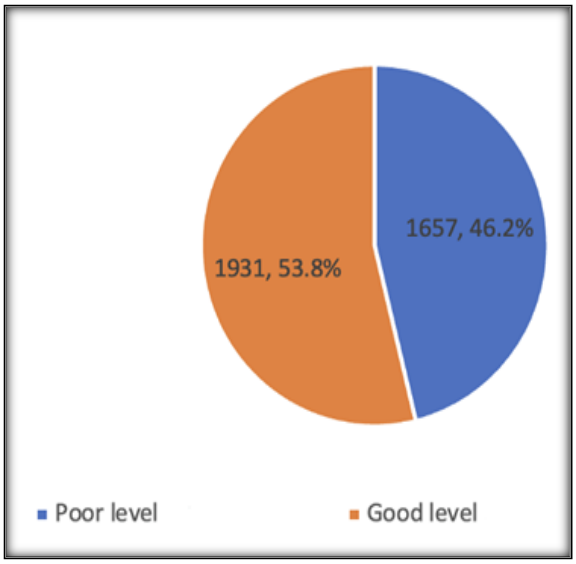

Figure 3: Distribution of participants according to level of knowledge on prevention of urinary stone disease. (N=3588)

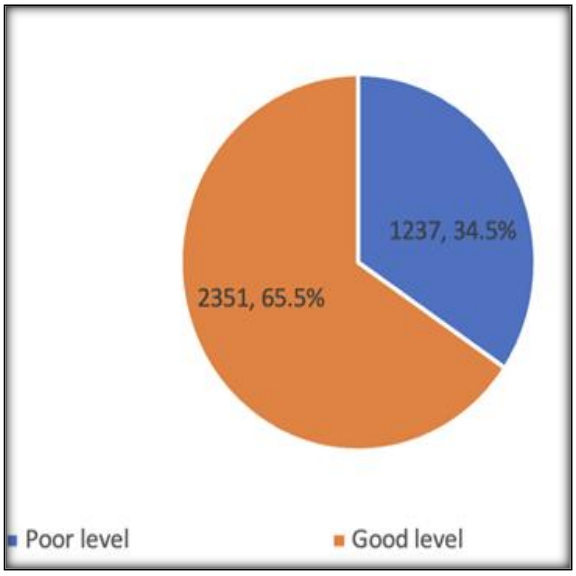

Figure 4: Distribution of participants according to level of literacy on urinary stone disease. (N=3588)

Table 1: Association between level of literacy and sociodemographic characteristics

Socio demographic characteristics	Groups	Level of literacy				P value
		Poor level (Score<11)		Good level (Score>=11)		
		No.	%	No.	%	
Age group	<=24	350	45	428	55	<0.001
	25-40	687	48.2	739	51.8	
	>40	493	35.6	891	64.4	
Gender	Male	768	42.5	1041	57.5	0.81
	Female	762	42.8	1017	57.2	
Nationality	EMR region	1185	44.6	1473	55.4	<0.001
	Others	344	37.1	582	62.9	
Employment status	Employed	1096	40.5	1609	59.5	<0.001
	Unemployed	434	49.2	449	50.8	

Table 2: Association between level of literacy and history of urolithiasis (3588)

Details of past history, family history of urinary stone disease	Groups	Level of literacy				P value
		Poor level (Score<11)		Good level (Score>=11)		
		No.	%	No.	%	
History of urinary stone	Yes	149	26.8	407	73.2	<0.001
	No	1381	45.5	1651	54.5	
History of UTI	Yes	351	36.1	621	63.9	<0.001
	No	1179	45.1	1437	54.9	
Family history of stone disease	Yes	88	30	205	70	<0.001
	No	1442	43.8	1853	56.2	
History of chronic renal condition	Yes	36	33	73	67	0.24
	No	1494	42.9	1985	57.1	

[Table 2] shows the association between the level of literacy and history of urolithiasis. Among the participants, (407, 73.2%) of the participants with a history of urinary stones demonstrated a good level of literacy. The association between a history of urinary stone and literacy level was found to be statistically significant with a p value <0.001. In addition, (621, 63.9%) of participants with a history of UTI exhibited a good level of knowledge. The association between history of UTI and literacy level was found to be statistically significant with p value <0.001. Moreover, (73, 67%) of participants with a history of chronic renal condition displayed a good level of knowledge. However, association between literacy level and history of chronic renal condition was found to be statistically insignificant with a p-value 0.24. Among the participants with family history of stone disease, (205, 70%) displayed a good level of literacy. The association between level of literacy and family history of urinary stone disease was found to be significant with p value <0.001.

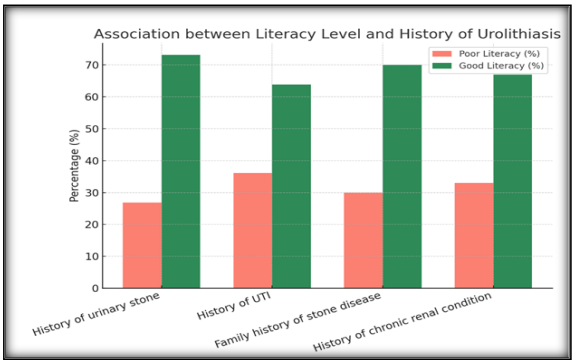

Table 3: Association between level of literacy and water consumption

Details of water consumption	Groups	Level of literacy				P value
		Poor level (Score<11)		Good level (Score>=11)		
		No.	%	No.	%	
Amount of water consumed per day	<0.5L	380	36	675	64	<0.001
	0.5-1L	705	41.2	1008	58.8	
	1-3L	265	46.9	300	53.1	
	>3L	180	70.6	75	29.4	

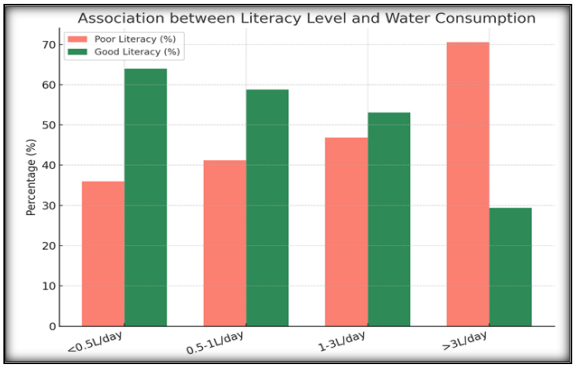

Table 3 demonstrated the association between level of literacy and water consumption. Among the participants who drink <0.5L of water per day, (675, 64%) showed a good level of literacy and (380, 36%) shows poor level of literacy. Among participants who drink 0.5 to 1 L of water per day, (1008, 58.8%) displayed a good level of literacy and (705, 41.2%) shows poor level of literacy. Among participants who drink 1 to 3L per day, (300, 53.1%) exhibited a good level of literacy and (265, 46.9%) shows poor level of literacy. Among participants who drink more than 3L of water per day, (75, 29.4%) showed a good level

of literacy and (180, 70.6%) shows poor level of literacy. The association between level of literacy and water consumption was found to be statistically significant with p value less than <0.001.

DISCUSSION

The present study assessed the level of knowledge regarding urinary stone disease (USD) among adults in the United Arab Emirates, with specific emphasis on complications, treatment and management, and preventive measures. The findings reveal considerable variations in literacy levels across these domains, reflecting both areas of strength and notable gaps that warrant attention.

In relation to complications of USD, more than half of the participants 55.1% demonstrated poor knowledge, whereas only 44.9% exhibited good knowledge. This deficit in awareness is clinically significant, as inadequate recognition of potential complications—such as recurrent urinary tract infections, obstruction, or chronic renal impairment—may delay timely medical consultation and contribute to adverse outcomes. The limited literacy in this domain highlights the need for targeted awareness initiatives that emphasize the consequences of untreated or poorly managed stone disease, thereby encouraging earlier health-seeking behavior.

Knowledge concerning treatment and management was relatively better, with 54.4% of respondents demonstrating good knowledge and 45.6% showing poor knowledge. While this reflects a modest improvement compared to awareness of complications, the proportion of participants lacking sufficient knowledge remains considerable. Misunderstandings regarding treatment options—for instance, the belief that surgery is the only therapeutic modality—may slow acceptance of less invasive approaches, including pharmacological management, lifestyle modification, and hydration therapy. Addressing these misconceptions through structured educational strategies could enhance informed decision-making and improve patient adherence to treatment regimens.

With regard to preventive strategies, 53.8% of participants displayed good knowledge, while 46.2% demonstrated poor knowledge. This finding underscores a moderate but insufficient level of public awareness about prevention, despite its essential importance in reducing recurrence. Preventive strategies such as maintaining adequate fluid intake, moderating dietary salt and protein consumption, and adopting healthy lifestyle habits are well-established in reducing the burden of stone formation. The relatively limited awareness in this area suggests a missed opportunity for primary prevention, particularly in a region where environmental factors such as high temperatures may predispose to dehydration and consequently, urinary stone formation.

From a public health perspective, these results highlight the importance of strengthening community-based health education programs in the UAE. Efforts should prioritize improving awareness of complications, correcting misunderstandings about treatment, and promoting preventive measures through sustained health promotion campaigns. Incorporating urinary stone disease awareness into routine clinical encounters, leveraging digital platforms, and utilizing culturally tailored health communication strategies may further enhance community knowledge and encourage behavioral changes.

Ultimately, improving literacy levels related to urinary stone disease is crucial for reducing disease burden, minimizing recurrence, and optimizing health outcomes. The findings of this study provide an empirical support that can inform policy-makers and healthcare providers in designing targeted interventions to bridge existing knowledge gaps within the UAE population.

In a separate study conducted in Saudi Arabia, findings indicated that 34.4% of individuals were informed about the possibility that daily caffeine consumption could lead to urinary stones.[3]

Moreover, a study conducted in AlAhsa, Saudi Arabia, brought to light that a modest 14.9% of participants were aware of the potential role of tea and coffee in the formation of kidney stones. Conversely, a significant majority, comprising 74.2% of participants, demonstrated a lack of awareness regarding this specific aspect.[10]

Participants demonstrated a moderate level of physical activity, 24.9% engaged in high-intensity exercise, and 35% reported a low level of physical activity. This nuanced breakdown underscores the varied spectrum of physical activity practices within the surveyed population in Iran.[12]

Among the participants in the age group less than 24, participants (428, 55%) had a good level of literacy. Whereas participants in the age group 25-40, (739,51.8%) had a good level of literacy. Additionally, participants surpassing the age of 40 showed a substantial literacy proficiency, with (891, 64.4%). Notably, there was a discernible upward trend in literacy levels with advancing age. The statistical analysis revealed a highly significant association between age groups and literacy levels, as denoted by a p-value below 0.001.

In contrast, an alternative study in the United Arab Emirates yielded results indicating no noticeable variance in knowledge levels between participants aged 20–29 and 30– 39. Interestingly, a distinct pattern emerged where individuals aged 40–49 demonstrated significantly higher knowledge levels compared to their counterparts in other age groups.7 A study conducted in the Hail region of Saudi Arabia revealed that increased age was associated with 12% more likelihood of higher awareness levels (OR = 1.12; 95% CI: 1.01-1.39).[13]

The observed association between age and urinary stone-related factors in the findings from the United

Arab Emirates and the other countries outlined here may be multifaceted, reflecting a convergence of demographic, cultural, educational, and lifestyle influences. The observed trend of higher literacy levels among older age groups may signify a cumulative effect of knowledge acquisition and awareness over time.

Within the framework of the current investigation concerning gender and literacy proficiency, it was observed that 57.5% of males, comprising 1041 individuals, exhibited a commendable level of literacy. Correspondingly, 57.2% of females, totaling 1017 individuals, showcased a similar proficiency in literacy. The statistical analysis revealed that the association between gender and literacy proficiency was deemed statistically insignificant, as indicated by a p-value of 0.81.

Drawing a comparative perspective with another study conducted in the United Arab Emirates, the results remained consistent, revealing a lack of discernible disparity in knowledge scores between males and females. This concordance between the current study and its counterpart in the UAE underscores a consistent pattern in the relationship between gender and literacy or knowledge levels across diverse contexts.[7]

On the contrary, an investigation encompassing the overall populace of Hail, Saudi Arabia brought to light a noteworthy distinction in awareness levels between genders. Specifically, the prevalence of poor awareness was markedly higher among male participants, constituting 62.2%, in contrast to their female counterparts with 56.5% (P = 0.049), signifying statistical significance.[13]

The observed disparities underscore the intricate influence of cultural, regional, and societal factors on gender-associated literacy and awareness levels regarding urolithiasis. Additionally, variations in educational opportunities between genders may contribute to differences in awareness levels. Societal norms, traditional perspectives and conservative family structures could limit educational access for females, potentially leading to lower awareness levels.

In regards to nationality, 1473 participants (55.4%) of participants from the EMR region had a good level of literacy while the remaining 582 participants (62.9%) from other nationalities also showed a good level of literacy.

Among the employed participants 1609 participants (59.5%) of them had a good level of literacy whereas 449 participants (50.8%) of the unemployed participants demonstrated a good level of literacy. However, there were no recent studies that assessed the association between employment status and urolithiasis formation.

Furthermore, in a comprehensive study conducted in Saudi Arabia, which encompassed participants from two distinct regions, individuals with a history of renal stones demonstrated heightened knowledge in specific domains. This signifies a notable correlation between experiences with renal stones and increased awareness or knowledge.[9]

The disparities in outcomes between the UAE and other nations can be ascribed to variations in healthcare methodologies, regional demographics, cultural shades and the efficacy of public health education initiatives. Furthermore, heightened awareness or knowledge appears to correlate with individual experiences with renal stones. 621 participants (63.9%) of participants with a history of UTI exhibited a good level of awareness. However, there were no recent studies that assessed the association between urinary tract infection and level of literacy.

Among the participants with family history of stone disease, 205 participants (70%) displayed a good level of literacy. A study conducted in the United Arab Emirates found that the presence of a family history of kidney stones, which was observed in 43.1% of the population, increases their knowledge regarding the risk factors.7 A study conducted in the Hail region of Saudi Arabia showed that the participants without a family history of urolithiasis have slightly lower levels of literacy in comparison to the participants with a positive family history with a p value of 0.661.13 The consistent findings from studies conducted in both the United Arab Emirates (UAE) and Saudi Arabia highlight a significant association between the level of literacy and a family history of urinary stone disease. This correlation may be attributed to increased knowledge transmission within families, contributing to enhanced levels of literacy. Families with a history of urinary stone disease may serve as important sources of information, fostering a heightened awareness and understanding of the condition, thereby influencing the literacy levels of individuals within those family units. This interconnected relationship highlights the potential impact of familial health experiences on educational outcomes and health literacy in both the UAE and Saudi Arabian contexts.

Among the participants who drink <0.5L of water per day, (675, 64%) showed a good level of literacy and (380, 36%) shows poor level of literacy. Among participants who drink 0.5 to 1 L of water per day, (1008, 58.8%) displayed a good level of literacy and (705, 41.2%) shows poor level of literacy. Among participants who drink 1 to 3L per day, (300, 53.1%) exhibited a good level of literacy and (265, 46.9%) shows poor level of literacy. Among participants who drink more than 3L of water per day, (75, 29.4%) showed a good level of literacy and (180, 70.6%) shows poor level of literacy. The association between level of literacy and water consumption was found to be statistically significant with p value less than 0.001.

Overall, the results underscore a pressing need for targeted public health education to improve awareness and prevention of urinary stone disease.

CONCLUSION

The study findings revealed that participants had a generally good level of literacy regarding urinary stone disease. Their knowledge covered about risk factors, preventive measures, treatment and management, and complications. Adults above 40 years of age were more likely to exhibit higher literacy levels. Employment was also found to be positively associated with better awareness. Participants who had personally experienced urinary stones showed stronger understanding. Similarly, those with a history of urinary tract infections demonstrated good literacy. A positive family history further contributed to increased awareness levels. Adequate water intake was another factor linked to improved literacy. These associations suggest that both personal experiences and lifestyle choices play a major role. Overall, demographic and health-related factors influenced the literacy of participants on urinary stone disease.

Recommendations

Awareness campaign should conduct periodic awareness programs for public to increase awareness and to apply prevention measures to reduce the recurrence. Future research is recommended involving more participants and covering larger demographic area of the country Dissemination of the findings Need to disseminate the results of the research to healthcare providers to make them realize their roles and responsibilities towards screening for USDs.

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