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ORIGINAL RESEARCH

Evaluation of Factors Associated with Urolithiasis: An Institutional Based Study

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ABSTRACT

Background: Urolithiasis is a common urologic disease characterized by a high incidence and recurrence rate, and it has a multifactorial etiology. The present case control study was conducted to evaluate factors associated with urolithiasis.

Material &Methods: The sample size was 100 cases and 100 controls. Information related to demographic characteristics, information on previous urinary stones, family history of urolithiasis, and dietary and other lifestyle factors was collected and analysed. A p-value less than 0.05 was considered statistically significant.

Results: Age and gender were found to have statistically significant ($p<0.001$) associations with urolithiasis. BMI was found to be statistically non-significant. Treatment for urinary diseasewas found to have statistically significant ($p<0.001$) association with urolithiasis. Family history and past urinary disease was found to be statistically non-significant. Exercise, smoking were found to have statistically significant ($p<0.001$) association with urolithiasis. Consumption of alcohol had a statistically non-significant association with urolithiasis. Consumption of salty foods, fast foods were found to have statistically significant ($p<0.001$) associations with urolithiasis. Amount of water they drink had statistically non-significant association with urolithiasis.

Conclusion: The study concluded that age, gender, treatment for urinary disease, exercise, smoking, consumption of salty foods, fast foods were the significant factors contributing to urolithiasis.

Keywords: Urolithiasis, Lifestyle Factors, Etiology.

INTRODUCTION

Urolithiasis is the most common disease of the urinary tract. It refers to the formation of urinary stones, also known as lithiasis, within the urinary tract[1] which lodged in the kidney(s).[2] Urolithiasis is one of the critical public health problems and urologic diseases globally, with a prevalence ranging from 1% to 13%. According to a Global Burden of Disease (GBD) study, the cases and deaths due to urolithiasis have increased since 1999.[3,4] These stones can develop in various parts of the genitourinary system, including the kidneys, ureters, bladder, and urethra. Urinary stones arise within the urinary tract when urine becomes overly saturated with minerals such as calcium, phosphate, and oxalate, leading to crystal formation. These crystals may increase in size, causing obstruction and retention within the kidneys.[5] It has been reported that urolithiasis as a multifactorial recurrent disease, distributed worldwide in urban, rural, non-industrial and industrial regions with different chemical composition of analysed stones in the context to various risk factors. Besides diet, genetic factors are also reported to contribute in pathogenesis of urolithiasis.[6] Factors that increase the predisposition to urinary stones include gender, age, body mass index (BMI), and geographical environment, leading to various stone components with different clinical characteristics.[7] The Fourier transform infrared spectroscopy is deemed the standard method of stone analysis since it is susceptible, selective, and applicable to all stone components.[8]The present case control study was conducted to evaluate factors associated with urolithiasis.

MATERIALS& METHODS

The sample size was 100 cases and 100 controls. The cases were selected from the Department of Urology for

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those who had confirmed the diagnosis of urolithiasis by ultrasound or radiographic procedure. The controls were those not diagnosed with urolithiasis and were selected from the general population. Patients with renal, bladder or urinary tract impairment or anomaly were excluded from the study.A self-administered questionnaire was used to collect data from the participants after getting informed consent. Information related to demographic characteristics, information on previous urinary stones, family history of urolithiasis, and dietary and other lifestyle factors were included in the study. Anthropometric measures such as height, weight and BMI were also collected from the participants. Data was collected and analysed using SPSS software version 27 (IBM Corp, Armonk, NY). A p-value less than 0.05 was considered statistically significant.

RESULTS

Age and gender were found to have statistically significant ($p<0.001$) associations with urolithiasis. BMI was found to be statistically non-significant. Treatment for urinary disease were found to have statistically significant ($p<0.001$) association with urolithiasis.

Family history and past urinary disease was found to be statistically non-significant. Exercise, smoking were found to have statistically significant ($p<0.001$) association with urolithiasis. Consumption of alcohol had a statistically non-significant association with urolithiasis. Consumption of salty foods, fast foods were found to have statistically significant ($p<0.001$) associations with urolithiasis. Amount of water they drink had statistically non-significant association with urolithiasis.

Table 1: Association Between Socio-demographic Variables and Urolithiasis.

Socio-demographic factors	Cases (n=100)	Control (n=100)	p-value
Gender			
Males	58	43	<0.001
Females	42	57	
Age groups			
18-20	64	15	<0.001
21-30	30	15	
>30	6	70	
BMI			
Normal	40	34	NS
Overweight	48	44	
Obese	12	22	

Table 2: Association Between Family History and Details of Past Treatment of Urinary Diseases and Urolithiasis.

Variables	Cases (n=100)	Control (n=100)	p-value
Family history			
No	54	48	NS
Yes	46	52	
Past Urinary disease			
No	56	45	NS
Yes	44	55	
Treated for urinary disease			
No	65	35	<0.001
Yes	35	65	

Table 3: Association Between Diet, Lifestyle Factors and Urolithiasis

Variables	Cases (n=100)	Control (n=100)	p-value
Exercise			
No exercise	36	64	<0.001
A little	10	30	
2 times a week	14	0	
3 times a week	40	6	
Smoking			
No	72	56	<0.001

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Yes	28	44	
Alcohol consumption			
No	75	66	NS
Yes	25	34	
Consumption of salty foods			
Never/ Rarely	40	14	<0.001
Twice a week	55	32	
Daily	5	54	
Consumption of fast foods			
Never/ Rarely	65	25	<0.001
Twice a week	25	51	
Daily	10	24	
Amount of water they drink			
1-3 cups	22	27	NS
4-8 cups	63	60	
>8 cups	15	13	

DISCUSSION

The development of kidney stones involves a multifaceted process influenced by intrinsic factors like age, sex, and heredity and extrinsic factors such as geography, climate, diet, mineral composition, and water intake.[12] While urolithiasis can affect individuals of all ages, genders, and races, it tends to be more prevalent in males aged 20–49 years.[9]

Age and gender were found to have statistically significant ($p<0.001$) associations with urolithiasis. BMI was found to be statistically non-significant. Treatment for urinary disease was found to have statistically significant ($p<0.001$) association with urolithiasis. Family history and past urinary disease was found to be statistically non-significant. Exercise, smoking were found to have statistically significant ($p<0.001$) association with urolithiasis. Consumption of alcohol had a statistically non-significant association with urolithiasis.Consumption of salty foods, fast foods were found to have statistically significant ($p<0.001$) associations with urolithiasis. Amount of water they drink had statistically non-significant association with urolithiasis.

It is widely recognized that a male predominance is evident in urolithiasis worldwide, with a reported male-to-female ratio range of 1.4–2.9:1.[10,11]

Chien et al. assessed 1802 patients and concluded that a higher age population (>60 years old) was 6.3 times more likely at risk of developing urolithiasis.[12]

In a study conducted at Taiwan in the year 2009, i.e. an increase of body size increases the risk of renal stone formation and higher BMI is associated with an increased risk of urolithiasis 35 (39.5%).[13]

This study reported that urolithiasis was commonly present in the age group of 25-44 years. Urolithiasis was observed to be significantly more common among those individuals who had history of urinary tract infection (UTI) (37.3%), and those who consumed only 2-4 glasses of water per day and with family history of stones"(67%).[14]

A meta-analysis conducted by Ling et al. analysed five articles of 20,400 subjects. It found that individuals who smoked cigarettes had a significantly higher risk of developing urinary stones than those who never smoked.[15]

Research conducted by Zhuo et al. showed that pickled food increased the risk of urolithiasis by 1.2 times in contrast with individuals who did not consume pickles that contained oil and salt.[16]

CONCLUSION

The study concluded that age, gender, treatment for urinary disease, exercise, smoking, consumption of salty foods, fast foods were the significant factors contributing to urolithiasis.

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