

The number of patients with chronic illnesses who underwent operative urological interventions for Urolithiasis in KFHU from 2019 to 2021

Abstract

Background

The incidence of urolithiasis is increasing globally, several Studies were done in Saudi Arabia and reported a high incidence of stone diseases. Several risk factors give rise to the development of the stones like gender, age, chronic disease, and abnormal weight. proper intervention and management are essential for such patients.

Objective

Our aim in this study is to estimate the number of patients with urolithiasis and chronic diseases who underwent urological intervention to identify the risk factors in these patients.

Method

A retrospective Cohort Study was conducted among 101 patients with known cases of chronic disease and present with stone disease, who underwent urological intervention in King Fahad University Hospital, between August 2019 to August 2021.

Result

The study shows a predominant number of males patient with a percentage of 75%. Saudi nationality is also dominant 70% of the participants are Saudis. Most patients were at age more than 51 with a percentage of 55% while the other patients are between 50 to 20 years, most of the patients 88% are having abnormal weight, while the remaining are within normal weight. Hypertension and Diabetes Mellitus are the main chronic diseases in the patients followed by Obesity. 60% of the patients were having Hypertension, while 54% complain of diabetes mellitus, for the obesity 53% of patients are obese. Most of the stones 66% were in multiple locations, followed by ureteric with 20% and 10% are kidney stones, only two patients were noticed to have a stone in the bladder.

Conclusion

Urolithiasis is common in Saudi Arabia and many factors contribute to the forming of stones, the finding of our study suggested that Saudi old Males patients with chronic disease are at high risk of developing urolithiasis, with the requirement of urological intervention.

KEYWORDS

Urolithiasis, Chronic disease, Age, Male, Saudi Arabia

introduction

Worldwide the prevalence of urolithiasis is dramatically increasing, and several risk factors contribute to the development and forming of the stone such as gender, age, and chronic disease(1). Globally there is clear geographic diversity in stone incidence, and it is difficult to evaluate the exact prevalence because of the differences in assessment methods and management across countries(2). Operative intervention accounts for more than 90% of the total management of kidney stones, removal of symptomatic stones relieves pain and reduces the harm to renal function and consider to be the first-line management for symptomatic stones(3). urology intervention is indicated for patients with a stone size greater than 5 mm or when a ureteral stone doesn't pass after two or four weeks of follow-up(4). The main principle of intervention in urolithiasis patients is to maximize stone clearance and minimize morbidity and complication(5). Patients with the stone disease are frequently known to be with metabolic diseases, such as hypertension, diabetes mellitus, or obesity, which might be serious risk factors for urolithiasis (6). The number of urological operative interventions for renal stones has increased significantly in Brazil, according to the Brazilian health care system, the number of cases increased from 10080 to 24713 cases annually over the past 15 years(7). Management of urolithiasis In Australia during the past 15 years has evolved significantly, and the annual number of operative interventions has increased as well(8). In Saudi Arabia, peoples are more prone to develop urolithiasis with a stone frequency 2.5 times more compared to non-Saudi populations(9). In the Eastern region of Saudi Arabia at King Abdelaziz Hospital, a retrospective cohort study was conducted on 235 patients with renal stones. The mean age of the participant was at age of 48 years with Hypertension as the most comorbidity associated with patients. Most of the patients (86.7%) had an operative intervention for stone removal while 13.4% of the patients had spontaneous stone clearance without doctors' intervention(10). In Saudi Arabia the prevalence of urolithiasis is high, most of the patients are present with chronic diseases and the need for operative intervention is increasing. The purpose of the study is to estimate the number of chronic diseases patients complaining of stone diseases to improve the services and care for them as well as decrease the cost-effectiveness of the operative stone intervention.

Methods

This is a Retrospective Cohort Study that was conducted at King Fahad University Hospital

Subjects:

The subject of our study are patients with chronic diseases who underwent urological surgical intervention (emergency or elective) between August 2019 to August 2021, This study includes patients with comorbidities including Diabetes Mellitus, Hypertension, Obesity, and other chronic diseases, Aged from 20 years to 70 years old, both genders. Excluding all medically free patients, dialysis patients, kidney transplant patients, and patients with renal failure.

Demographic data of the patients, history of comorbidities, laboratory, and radiologic findings, all will be collected in an excel sheet for statistical analysis. The sample size is a total of 808 patients who underwent urological intervention and according to our criteria, 101 patients were matched and included. IRB number (IRB-UGS-2021-01-425).

Variables:

Independent: gender, age, nationality

Dependent: BMI, the correlation between diseases, diseases.

Controlled: no controlled variables

Materials:

The materials we used are the following:

- 1- Excel sheet for the arrangement of patient's data
- 2- Quadramed system of the hospital to extract the patient's data
- 3- SPSS program for data analysis

Procedures:

- 1- Get IRB approval
- 2- Determine inclusion and exclusion criteria.
- 3- limit subjects to inclusion, and exclusion criteria, and decide the time window.
- 4- gather the required information.
- 5- Analyze data.
- 6- Determine the number of urolithiasis patients.

Data analysis:

categorical variables were presented by numbers and tested by chi-square test, and we used spss software for data analysis.

Results

The study sample that fulfilled the criteria reached (101) patients out of (808) in which this patient undergoes urolithiasis operative intervention, this number represents (12.5%) of total operative Urological patients in the hospital. According to the gender variable, most of the patients were males (76) patients with a percentage of (75.2%), while (25) patients with a percentage of (24.8%) were females **as shown in figure (1)**. Regarding the age variable, more than half of the patients (56) with a percentage of (55.4%) their age (51 years or more), while there were (26) patients with a percentage of (25.7%) aged between (41-50 years), finally there were (19) patients their age (less than 40 years) **as shown in Figure (2)**. In addition, as for the nationality variable, most patients were Saudi (71) patients with a percentage of (70.3%), while there (30) patients with a percentage of (29.7%) were non-Saudi **as shown in figure (3)**.

According to the BMI variable, more than half of the sample (55) patients with a percentage of (54.5%) were obese, in addition there (22) patients with a percentage of (21.8%) were overweight, and (10) patients with a percentage of (9.9%) were Healthy Weight, finally, there one patient with a percentage of (1.0) was underweight **as shown in figure (4)**. More than half of the patients (60) a percentage of (59.4%) have HTN disease, while there are (57) patients a percentage of (56.4%) have DM disease, as for there are (54) patients with a percentage of (53.5%) have Obesity disease, there are (33) patients with percentage of (32.7%) who have other diseases (asthma – Dyslipidaemia – lung cancer – multiple toe amputation – axillary abscess), in addition (15) patients with percentage of (14.9%) have heart diseases, also, there are (7) patients with percentage of (6.9%) have kidney diseases, besides, there are (6) patients with percentage of

(5.9%) have Thyroid diseases, as for there are (5) patients with percentage of (5.0%) have UTI diseases, finally, there is one patient with a percentage of (1.0%) has Parathyroid diseases **as shown in figure (5)**. Regarding stone location, there are (67) patients with a percentage of (66.3%) their stones in multiple locations there are (21) patients with a percentage of (20.8%) their stones located in ureteric, and there are (11) patients with a percentage of (10.9%) their stone located in the kidney, finally, there are (2) patients with percentage of (2.0%) their stone located in the bladder **as shown in figure (6)**. There was no statistical correlation between stone and other diseases, p-values were greater than 0.05 **as shown in table (3)**.

Tables:

Table 1: The distribution of the study sample according to their demographic characteristics (n=101)

Variables	Items	Frequency	Percent
Gender	Male	76	75.2
	Female	25	24.8
Age	less than 40	19	18.8
	41-50	26	25.7
	51 or more	56	55.4
Nationality	Saudi	71	70.3
	non-Saudi	30	29.7
BMI	Underweight	1	1.0
	Healthy Weight	10	9.9
	Overweight	22	21.8
	Obesity	55	54.5

Table 2: the diseases suffered by patients (n=101)

Diseases	Variables	Frequency	Percent
HTN	yes	60	59.4
	no	41	40.6
DM	yes	57	56.4
	no	44	43.6
Heart diseases	yes	15	14.9
	no	86	85.1
Kidney diseases	yes	7	6.9
	no	94	93.1
Obesity	yes	54	53.5
	no	47	46.5
UTI	yes	5	5.0
	no	96	95.0
Thyroid	yes	6	5.9
	no	95	94.1
Parathyroid	yes	1	1.0
	no	100	99.0
Stone	yes	101	100
	no	0	0.00
Location	kidney	11	10.9
	ureteric	21	20.8
	bladder	2	2.0
	multiple	67	66.3
Other	yes	33	32.7
	no	68	67.3

Table 3: chi-square test for the correlation between stone and diseases (n=100)

<i>Diseases</i>	<i>Stone</i>	
	<i>Chi-square value</i>	<i>P-value</i>
HTN	<i>0.028</i>	<i>0.868</i>
DM	<i>0.155</i>	<i>0.694</i>
Heart diseases	<i>0.429</i>	<i>0.513</i>
Kidney diseases	<i>0.481</i>	<i>0.488</i>
Obesity	<i>1.641</i>	<i>0.200</i>
UTI	<i>3.657</i>	<i>0.056</i>
Thyroid	<i>0.214</i>	<i>0.644</i>
Parathyroid	<i>0.702</i>	<i>0.402</i>
Other	<i>0.041</i>	<i>0.839</i>

Graphs and figures:

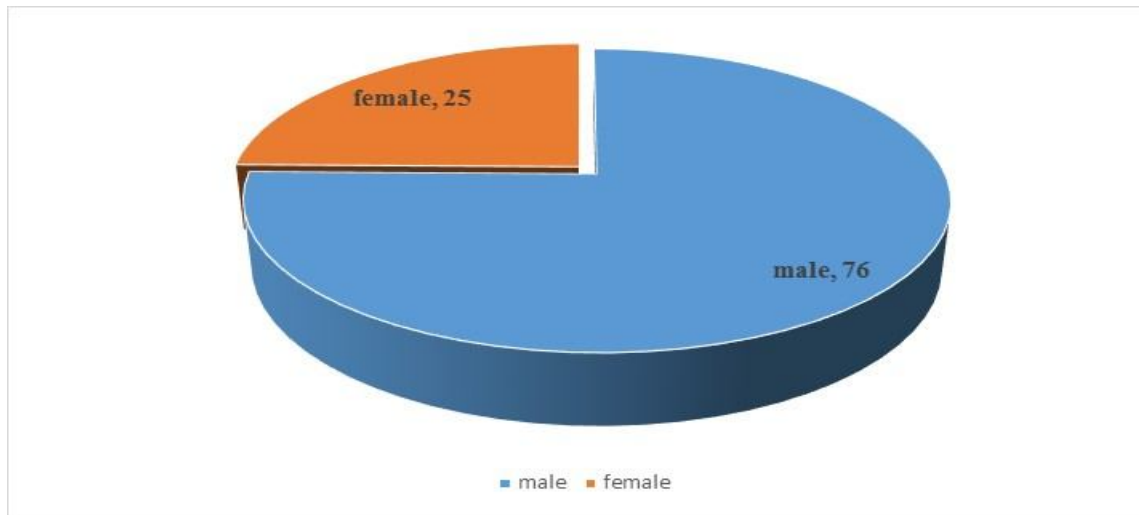


Figure (1) the distribution of the study sample according to gender

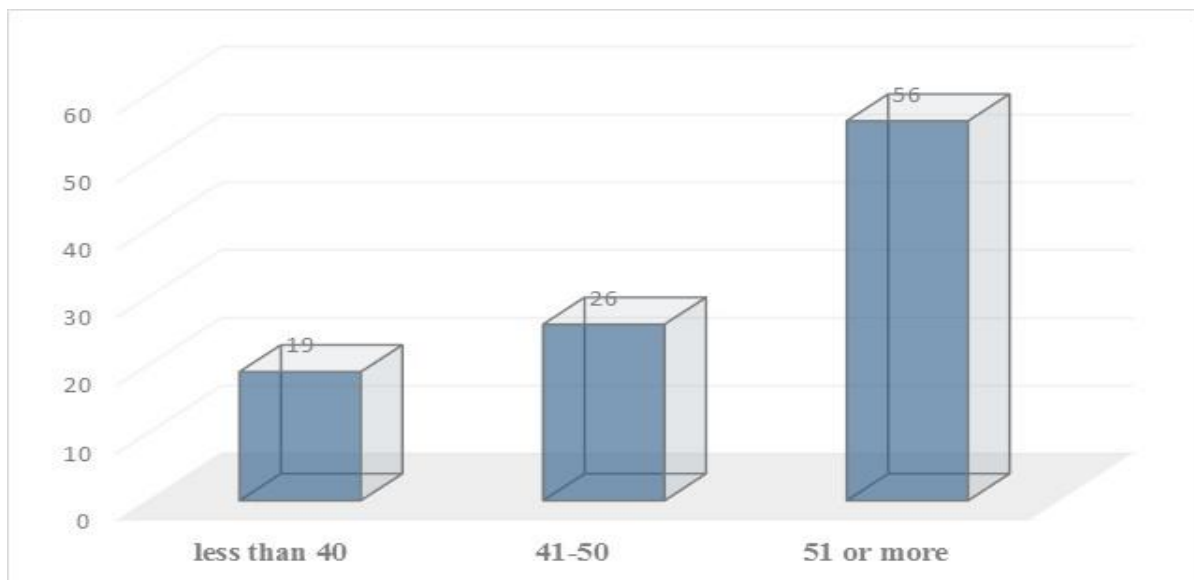


Figure (2) the distribution of the study sample according to age

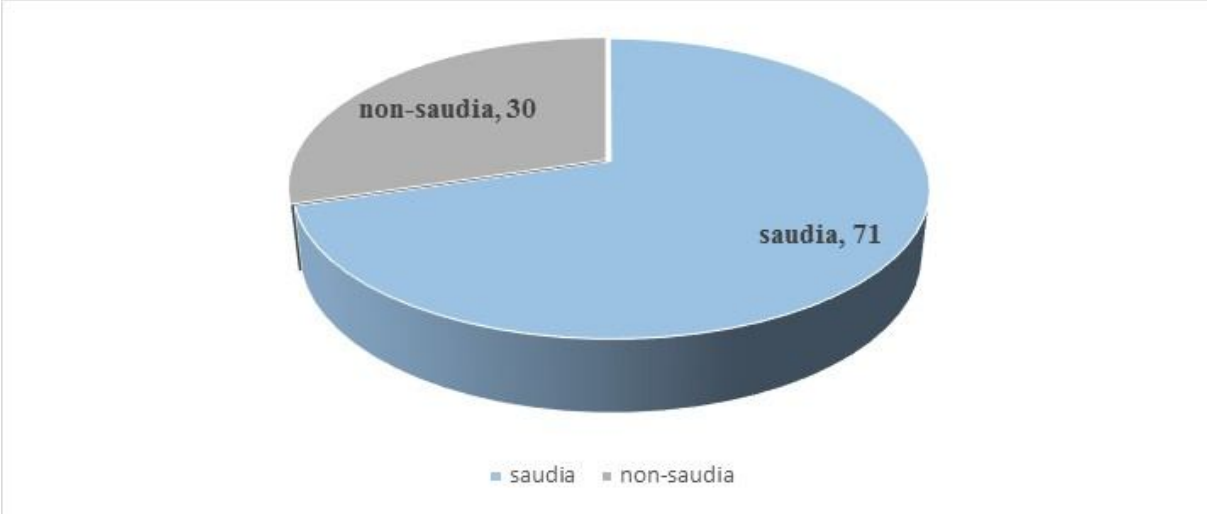


Figure (3) the distribution of the study sample according to nationality

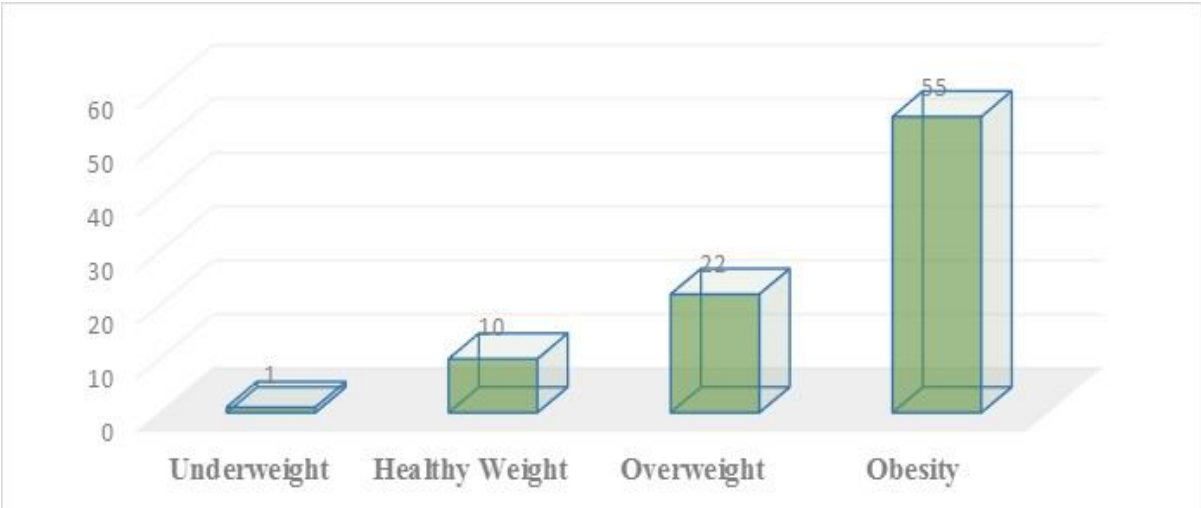


Figure (4) the distribution of the study sample according to BMI

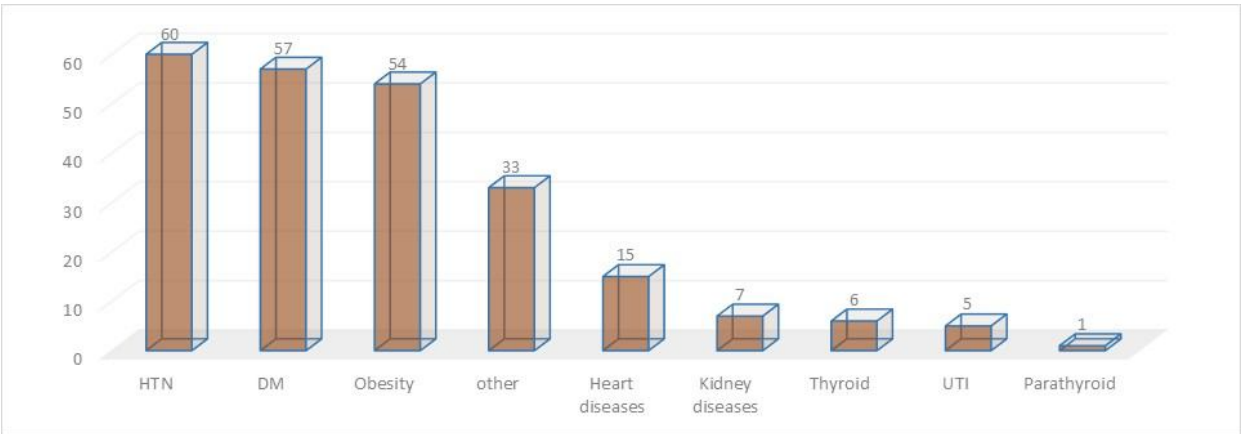


Figure (5) the diseases suffered by patients

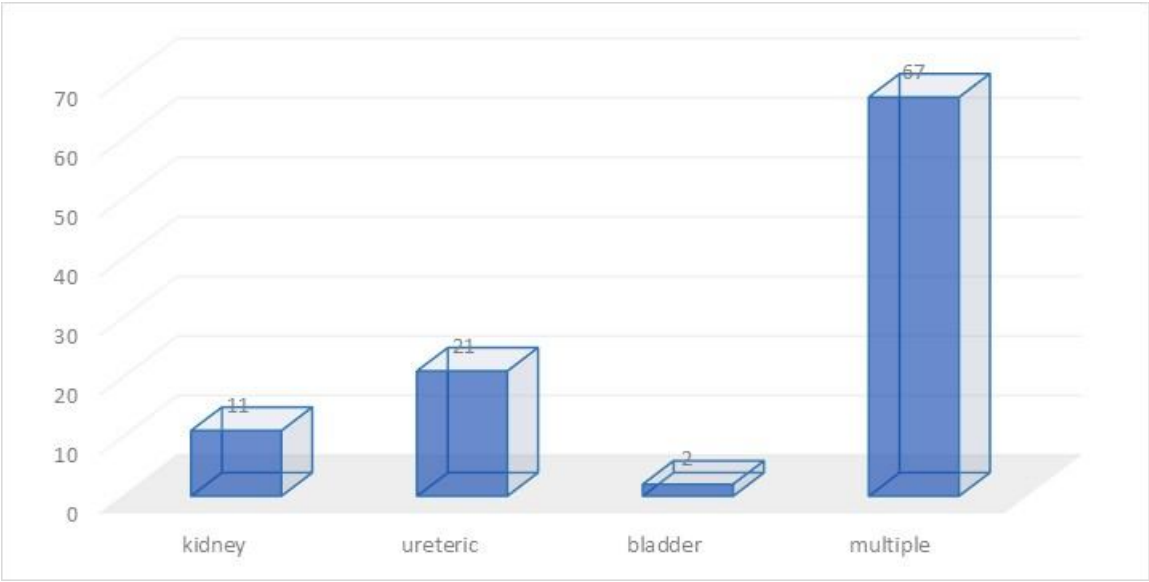


Figure (6) stone location

Discussion

In Saudi Arabia, Urolithiasis is the most common disease in the urology clinic. Multiple factors contribute to the development of stone disease, including lifestyle habits, dehydration, race, gender, age, chronic disease, and abnormal BMI (11). Urolithiasis incidences increase with age, peaking at the age between 30 to 60 years and decreasing after, males are more prone to have urolithiasis in most nations, with male to female ratios ranging from 1.3 to 5, the reasons behind that might be because of lifestyle habits, diet, and hormonal factors, and it varies between countries (6). Obesity has been linked to urolithiasis in many previous studies. One study done in Jeddah, Saudi Arabia, showed that in a patient with urolithiasis, 54.5% of the participants presented with abnormal weight, indicating a strong link between BMI and stone development (13). Proper treatment and operative interventions guidelines for renal stones, must be directed by the patient's status and the stone factors, to get the maximum benefit and outcome (14). Insulin resistance is one of the most well-known mechanisms of stone formation in hyperglycemia, research has established a link between diabetes mellitus and kidney stones, there is a strong link between DM patients and an increased risk of kidney stone formation, Diabetic patients are three times more likely to develop urolithiasis when compared to healthy individuals (15). Our study shows a male predominant number, during the study duration 76 out of 101 patients were males gender it is like other studies done in Saudi Arabia, males are more prone to develop urolithiasis and they require surgical intervention to relieve the pain. Patients presented to the urological clinic are different in age. In our study, we were focused more on the adult patient from 20 to 70 years old, half of the patients were between 51 and 70 years old, the other half were between 20 to 50 years old, which gives the idea when a patient gets older it raises the risk of having urolithiasis. Most patients in the study were Saudi, with a rate more than two times of non-Saudis as was expected and observed in previous studies, the Saudi people are at high risk of developing urolithiasis than other nationalities. Most of the patients were obese and overweight. In contrast, approximately 10% of the patients were Healthy and underweight, which supports the idea of the relation between urolithiasis and excessive weight and the need for surgical intervention to become more effective. Patients with the stone disease are usually present with one or more chronic diseases, operative intervention for those patients is required to relieve the pain and minimize the complications of the stone and comorbidity. Our focus in the study is on the patients present with comorbidity. To estimate the number of patients undergoing operative intervention and the disease they have, more than half of the patients are present with two main chronic diseases, HTN and DM. The other patients are complaining of various other chronic diseases. These numbers indicate that patients with HTN and DM are more prone to have urolithiasis and require operative intervention than other chronic diseases. Stone formations are various in the location it can be found in the ureter, kidney, or multiple locations. Our data shows that the majority, more than 60% of patients have various stones with multiple locations; the ureter is the second most common location, followed by the kidney and bladder, indicating patients who need operative intervention are compline of multiple stones in multiple locations rather than a single stone in one location.

Conclusion

The primary goal of this study is to determine the number of stone diseases in patients with chronic diseases living in Saudi Arabia's eastern province from August 2019 to August 2021 and admitted for urology surgical intervention, as well as to assess the relationship between self-reported kidney stone history, gender, age, race, and other comorbidities. The findings in our study suggest that older male patients with chronic diseases living in Saudi Arabia's eastern province have a higher risk of developing kidney or ureteric stones. The most risk factors associated with urolithiasis are chronic diseases 59.4% of the patients were hypertensive as well as 40.6% were diabetic and more than half of them were obese. These comorbidities and other factors have a significant impact on the epidemiology of urolithiasis in Saudi Arabia.

Application

Based on the finding of our study, most patients are older males with chronic comorbidity, and they require surgical intervention to relieve the pain and improve their health, the medical staff needs to give more focus on these types of patients and give the maximum care for them because they need more care and effort than other patients admitted with the same issues.

Limitation And Recommendations

There are many limitations to this study that should be discussed, mainly associated with the nature of the study, which is a retrospective study, since the Data was collected through the hospital system some of the patients have old or no available data like demographic data or more even importantly the imaging studies or stone analyses. Furthermore, some patients have no updated documented data about their comorbidities which would underestimate the correct association between urolithiasis and the comorbidities, However, this present study of the numbers of urolithiasis patients with chronic diseases in the KFUH included large numbers of patients that would minimize the effect of those variables and should give a satisfactory analysis of stone diseases and the associated comorbidities. A prospective study will give more precise answers to some of the questions that are related to the number of patients with urolithiasis in the KFUH. For the future Direction, larger studies looking at urolithiasis among chronic illness patients from multiple hospitals in the eastern province or even across the country would give a superior view of the overall stone diseases issues among such patients. We recommended studies be done in multiple hospitals in the eastern province of Saudi Arabia or more even across all the regions of Saudi Arabia, the study would give a better understanding of the disease and the associated risk factors, that we use to improve our services and increases the effectiveness of the operative stone intervention in Saudi Arabia.

Reference

1. Romero V, Akpinar H, Assimos DG. Kidney stones: a global picture of prevalence, incidence, and associated risk factors. *Rev Urol [Internet]*. 2010;12(2–3):e86–96. Available from: <https://pubmed.ncbi.nlm.nih.gov/20811557>
2. Taguchi K, Cho SY, Ng ACF, Usawachintachit M, Tan YK, Deng YL, et al. The Urological Association of Asia clinical guideline for urinary stone disease. *International Journal of Urology [Internet]*. 2019 Jul 1 [cited 2022 Mar 29];26(7):688–709. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/iju.13957>

3. Scales CD, Lai JC, Dick AW, Hanley JM, van Meijgaard J, Setodji CM, et al. Comparative Effectiveness of Shock Wave Lithotripsy and Ureteroscopy for Treating Patients With Kidney Stones. *JAMA Surgery* [Internet]. 2014 Jul 1 [cited 2022 Mar 29];149(7):648–53. Available from: <https://jamanetwork.com/journals/jamasurgery/fullarticle/1871854>
4. Hubner WA, Irby P, Stoller ML. Natural History and Current Concepts for the Treatment of Small Ureteral Calculi. *European Urology* [Internet]. 1993 [cited 2022 Mar 27];24(2):172–6. Available from: <https://www.karger.com/Article/FullText/474289>
5. Miller NL, Lingeman JE. Management of kidney stones. *BMJ* [Internet]. 2007 Mar 3;334(7591):468–72. Available from: <https://pubmed.ncbi.nlm.nih.gov/17332586>
6. Liu Y, Chen Y, Liao B, Luo D, Wang K, Li H, et al. Epidemiology of urolithiasis in Asia. *Asian Journal of Urology* [Internet]. 2018 Oct 1 [cited 2022 Apr 8];5(4):205. Available from: </pmc/articles/PMC6197415/>
7. Marchini GS, Mello MF, Levy R, Vicentini FC, Torricelli FCM, Eluf-Neto J, et al. Contemporary Trends of Inpatient Surgical Management of Stone Disease: National Analysis in an Economic Growth Scenario. <https://home.liebertpub.com/end> [Internet]. 2015 Aug 14 [cited 2022 Mar 29];29(8):956–62. Available from: <https://www.liebertpub.com/doi/abs/10.1089/end.2015.0021>
8. Lee MC, Bariol SV. Evolution of stone management in Australia. *BJU International* [Internet]. 2011 Nov [cited 2022 Mar 29];108(SUPPL.2):29–33. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1464-410X.2011.10695.x>
9. Trinchieri A. Epidemiology of urolithiasis: an update. *Clin Cases Miner Bone Metab* [Internet]. 2008 May;5(2):101–6. Available from: <https://pubmed.ncbi.nlm.nih.gov/22460989>
10. Alasker A, Hamri S bin, Noureldin YA, Alsaghyir AA, Alhajress GI. Characteristics and Types of Urolithiasis in the Eastern Region of Saudi Arabia: A Single-Center Retrospective Study. *Cureus* [Internet]. 2022 Mar 7 [cited 2022 Mar 27];14(3). Available from: <https://www.cureus.com/articles/88058-characteristics-and-types-of-urolithiasis-in-the-eastern-region-of-saudi-arabia-a-single-center-retrospective-study>
11. Abomelha MS, Al-Khader AA, Arnold J. Urolithiasis in Saudi Arabia. *Urology* [Internet]. 1990 [cited 2022 Apr 8];35(1):31–4. Available from: <https://pubmed.ncbi.nlm.nih.gov/2296813/>
12. Nassir A. Prevalence and characterization of urolithiasis in the Western region of Saudi Arabia. *Urology Annals* [Internet]. 2019 Oct 1 [cited 2022 Apr 8];11(4):347. Available from: </pmc/articles/PMC6798300/>
13. Assimos D, Krambeck A, Miller NL, Monga M, Murad MH, Nelson CP, et al. Surgical Management of Stones: American Urological Association/Endourological Society Guideline, PART I. *The Journal of Urology* [Internet]. 2016 Oct 1 [cited 2022 Mar 29];196(4):1153–60. Available from: <https://www.auajournals.org/doi/abs/10.1016/j.juro.2016.05.090>
14. Baathiah N, Alhazmi R, Albathi F, Albogami E, Mohammedkhalil A, Alsaywid B. Urolithiasis: Prevalence, risk factors, and public awareness regarding dietary and lifestyle habits in Jeddah, Saudi Arabia in 2017. *Urology Annals* [Internet]. 2020 Jan 1 [cited 2022 Apr 8];12(1):57. Available from: </pmc/articles/PMC6978981/>

