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Kidney Stone Prevalence and Treatment Outcomes Undergoing Percutaneous Nephrolithotomy (PCNL) for Kidney Stones

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ABSTRACT

Background: Kidney stones (nephrolithiasis) are becoming frequent in CMH Peshawar, District Peshawar, Khyber Pakhtunkhwa, Pakistan, and may require surgery. PCNL, an established modality for large renal stones, has not been adequately investigated in terms of the outcomes and salience of comorbidities to operative success in this part of India. The study aimed to determine the commonality of kidney stones and their treatment results in patients undergoing PCNL at CMH Peshawar.

Methods: This is a retrospective study of 100 patients diagnosed with kidney stones between November and December 2024. Ten patients in 10 different demographic and clinical groups were analyzed. The hospital records were reviewed for clinical presentation, laboratory profiles, and postoperative care. After that, the patient was started on Antibiotics (Cefoperazone + Sulbactam) and a Tramadol tablet for Pain Management. Renal function markers and surgical outcomes were statistically analyzed.

Results: There was a high incidence of kidney stones in the region, and patients presented with different demographics and symptoms. Consequently, comorbidities like hypertension and diabetes are shown to be associated with the critical aspects of markers of renal function and also acquisition. Overall, PCNL was successful in stone extraction, but the treatments were associated with considerable hindrances such as infections and patient compliance issues. This finding underlines the necessity of personalized therapies, since patients with comorbidities suffer from more severe complications.

Results: The study showed a gradual increase in the burden of renal calculi at CMH Peshawar and an outstanding impact of PCNL to treat the stone. Incorporation of patient comorbidities into models of treatment response is critical to the development of personalized therapeutic approaches. The research also concludes its recommendation for large-scale studies and long-term follow-up to observe safety outcomes and a long-term plan of management in case of frequent kidney stones.

Keywords: Kidney stones, Prevalence, Renal function, Comorbidities, Percutaneous Nephrolithotomy, Clinical outcomes.

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INTRODUCTION

Kidney stones — renal lithiasis or urolithiasis — are hard, solid masses in the kidneys that form when there are high levels of minerals and salts in the urine that tend to crystallize and stick together [1]. There are many types of kidney stones, each consisting of tiny crystals that separate from urine and build up on the inner surfaces of the kidneys. These stones come in varying shapes and sizes, including calcium oxalate, phosphate, struvite (infection-related), uric acid, and cystine stones. Kidney stones form due to an imbalance in urine composition, an excess of calcium, oxalate, or uric acid, or a lack of chemicals that prevent crystals from sticking together [18]. We usually classify kidney stones based on their location within the urinary tract (kidney, ureter, and bladder) and by their chemical composition. Diagnosis is challenging due to the radiolucent nature of the stones. Still, ultrasound, especially coupled with CT scans and urine tests, can help identify and classify them according to the type of stone they are most likely to be, as this information guides treatment. Kidney stones have been recognized for centuries, going back to ancient times, with the earliest documented discovery found in Egyptian mummies that date as far back as 4800BC [7]. Hippocrates, often called the "Father of Medicine," wrote about kidney stones as well; he discussed diseases of the urinary tract and bladder stones. There have been several treatments that have developed over centuries, and one of the earliest surgical methods was lithotomy, which is recorded even in the sixteenth century for stone removal. In the late 20th century, technological advances allowed for noninvasive therapies like extracorporeal shock wave lithotripsy (ESWL), ushering in a new era in the management of kidney stones. Major advances in biochemistry and radiology throughout the 19th and 20th centuries allowed investigators to determine risk factors, association with some genetic propensities, and dietary habits that affect the formation of kidney stones. No less common a defect is the Cadaveric renal stones inflicted in the cellophane for three million masses every year. Rates of kidney stones have increased, likely linked to changes in diet and lifestyle. A major challenge in the treatment of kidney stones is that about 50% of patients will develop another stone within 5 years after their stones are first found. Such trials continue to demonstrate the need for additional evaluation of stone-forming etiologies in recurring cases and to design novel approaches to control and prevent the recurrence of these painful conditions. Kidney stones can cause a lot of pain and distress, which can then affect your quality of life, and some patients may need surgical removal of the kidney stones. This dual-pronged burden on patients and healthcare necessitates an urgent approach to addressing kidney stone management both clinically and from a public health standpoint. Kidney stones are a very costly condition in healthcare systems globally, especially in the United States, where kidney stone treatment accounts for about $ 2bn in medical care annually. Similarly, kidney stone episodes are also a leading cause for emergency room visits and hospital admissions with concomitant high healthcare spending. Besides the direct medical costs, kidney stones have significant indirect economic consequences as well through loss of work productivity due to sickness absence. Kidney Stones are also influenced by socioeconomic factors, including income and a country's architecture, as well as access to healthcare; thus, disparities in incidence and treatment remain high across countries. This could

worsen the problem of kidney stone formation and its cost in these models by making it more difficult for low-income populations to access preventive screening or to follow up with dietary modifications. Example data shows that up to 10% of people living in the United States will have a kidney stone at some stage [9], with men and women being affected similarly [9]. Traditionally, more men than women used to get kidney stones, but the gender gap has been closing, and that is in keeping with obesity rates and other metabolic diseases now seen in a workforce that is over half female. In one study, the annual incidence rate of kidney stones is estimated at 1.8%. Still, this number may be an underestimate due to differences in reporting, especially for cases that necessitate medical or surgical interventions [10]. Globally, prevalence rates of kidney stones are substantially variable. The prevalence of kidney stones is higher in developed countries, thought to be influenced by dietary habits containing high salt and animal protein, and an increase in rates of metabolic syndrome. At the same time, rates are rising in some developing countries — primarily because of dehydration and malnutrition. The other critical factor is climate, with higher rates found in warmer weather and dehydration, which often accompanies hotter climates. In addition, drinking fewer jugs of water daily increases the probability of getting kidney stones in regions where either the water quality is poor or there may not be safe access to clean drinking tap water. The chances of having kidney stones increase with Age, peaking between 30 and 60 years. Although previously believed to be common in men, kidney stones are becoming more widely diagnosed in females, perhaps due to the growing frequency of obesity in women. Racial and ethnic variations have been pointed out as one of the notable factors; there are higher incidences in non-Hispanic whites than in the Black and Hispanic populations. A mix of genetic variables, diet, or access to health care may explain these differences. There is a substantial cost to society associated with kidney stones. Besides potentially high direct medical costs (e.g., emergency room visits, hospitalizations), the increasing prevalence of kidney stone disease in many parts of the world imposes an economic burden on healthcare systems worldwide. In addition, with the global burden rising worldwide, healthcare systems need to adapt how they treat an ever-expanding population. Eating habits: a poor overall diet featuring high intakes of oxalate-rich foods, too much sodium, and animal protein, along with not enough liquid intake, is linked to kidney stones. Marie Eatough, who is mentioned in the story, could modify diets to include more citrus fruits (high in citrate) or, in some cases, use medications that contain citrate to help reduce stone risk. Also, certain genetic factors have a critical effect on an individual's propensity to form kidney stones, especially those that are linked with calcium and oxalate metabolism. Environmental factors, such as climate, water composition, and lifestyle choices, also play a role in the genesis of kidney stones besides genetic predispositions. How Kidney Stones Form — Kidney stones begin when the urine is supersaturated with minerals like calcium, oxalate, or uric acid. This results in nucleation, where the ions come together and create a structure known as a crystal. If they remain in the kidneys, these crystals can grow and develop into stones. Factors including urinary stasis and tubular damage contribute to the increased chances of stone retention. Supersaturation occurs due to diet, hydration status of the person, and some medical conditions like high urinary calcium

(hypercalciuria) or low citrate. The pH level in your urine is vital to the formation of stones as well. Uric acid stones form in acidic urine, and calcium phosphate stones form when the urine is alkaline. In addition, other factors such as hyperparathyroidism and various metabolic disorders exacerbate the risk of kidney stone formation Finally, kidney stones are an essential global burden that is increasing in incidence. Kidney stones form through complex and as yet unknown interactions between several dietary, genetic, environmental, and metabolic components. Better management has been made due to the improvements in treatment, like ESWL and PCNL, noninvasive methods; however, the recurrence rate remains very high. To lower the worldwide burden of kidney stones and healthcare expenses, effective strategies are needed for prevention, including a variety of hydration and dietary approaches. Further research is required to design new prevention and treatment strategies against the root causes of kidney stone formation, which may also decrease the likelihood of kidney stones forming again in the same person.

METHODS

This research was conducted at the CMH Peshawar from November 2024 to December 2024. This study focuses on patients diagnosed with kidney stones and their complications, particularly those admitted through percutaneous nephrostomy (PCN) surgeries and other conservative treatments at the CMH Peshawar Urology Department, affiliated with District Peshawar. Patients: Based on a population of 100 patients, 10 from each of 10 different groups representing unique clinical or demographic features (e.g., Age, kidney stone severity, co-morbid conditions). This framework enabled us to perform a complete and balanced investigation of kidney stone treatment results. Study Design: This was a retrospective study from November 2024 to December 2024. In this study, the focus was on patients diagnosed with kidney stones, before, during, and after (the fx device was used for fertility procedure) undergoing percutaneous nephrolithotomy(PCNL) surgery or other correlated treatments. The categories were based on various clinical and demographic factors. One hundred patients (10 per Group) were randomly chosen. The result was the ability to study how common kidney stones and certain related conditions are in particular regions, as well as who is at the highest risk of complications from a kidney stone.

Inclusion Criteria:

Patients with the diagnosis of kidney stones and complications from them (obstructive uropathy).

Patients who had undergone PCNL surgery or were scheduled to undergo other kidney stone treatment procedures.

Adults in the 25-75-year age group, both males and females.

Ethnically diverse subjects in the CMH Peshawer urology department District.

10 unique cohorts defined by different clinical and demographic features (obviously, Age, kidney stone size, comorbidities).

Exclusion Criteria:

Non-cirrhotic ascites or other diseases unrelated to kidney stones. 15

Pregnant women or those who had been pregnant during the study period.

People with severe chronic conditions (eg, cancer, heart disease, infections) that could impact the management of kidney disease.

Patients are not providing consent for participation.

Data Collection:

Demographic Information:

Age, gender, socioeconomic status, family history of renal disease, and district of residence.

Clinical Information:

Chief complaints (flank pain, UR, NV).

Physical exam findings including vital signs (e.g., BP, HR, and RR).

Laboratory and Diagnostic Tests:

Complete Blood Count (CBC): White blood cell count (WBC), hemoglobin (HB), platelet count(PLT).

RFT (Renal Function Tests): Serum creatinine, urea, and other kidney function markers.

Radiology Imaging ◊ US: Kidney stone size, hydron (if any) & complications.

Serum Electrolytes: Sodium, calcium, albumin levels.

Treatment Regimen:

Medications: the medications prescribed during the hospital stay, including pain control medications, antibiotics, and other therapies.

Postoperative Care:

Treatment follow-up and discharge instructions for surgeries such as PCNL.

Sampling Method: Consecutive Sampling (Not Probability). Sample Size: 10 per Group (~10 Groups). The full sample of patients, comprising 100,000, was divided into 10 different categories based on clinical characteristics, including age range, stone size, and comorbidities. Patients were included according to availability, volunteering, and the completeness of medical records during the study interval. This is further ensured in our grouping, in which all the modalities for the treatment of kidney stones across different demographic and clinical profiles are incorporated.

Data Analysis: The collected data was processed and analyzed using IBM SPSS Statistics.

Analysis: Descriptive and comparative statistics were used to analyze data.

RESULTS

He was a 55-year-old male, Bahroz Khan, who presented at our operating theater; he had a nephrostomy tube with a history of flank pain, fever, urinary retention, scrotal swelling, and burning micturition. The serum pressure was 160/90 mmHg, and SpO2: 98% (Table 1). Hypertension; History of He underwent a CBC showing TLC of 10.3, Hb of 13.1, and PLT of 409,000 with otherwise non-significant blood count. The RFTs showed creatinine to be normal at 1.0; however, the urea was raised at 49 mg/dL. His RBS was 93 mg/dl. Diagnosis was a 4 mm calculus with moderate hydronephrosis and ureteral dilation, with advice for PCNL. The treatment being administered was Inf Provas (Acetaminophen), Inj No Spa (Drotaverine), Inj 2SUM (Cefoperazone + Sulbactam), and Inj Risek (Omeprazole). No concomitant medications or side effects were reported. The patient was adherent to treatment, improved, and was subsequently discharged. Case presentation: A 45-year-old male named Bakht Shaheen presented with the complaints of a fever, flank pain, burning micturition, and Nausea. His past medical history was significant for a PCNL 3 years ago and a pylolithotomy 10 years back. Laboratory findings revealed a WBC count 8.5×10^3, RBC count of 2.89×10^6, HB level of 8.4, while PLT counts were significantly raised at 927K His renal function tests (RFTs) demonstrated an increase in creatinine to the level of 2.35 mg/ dl and urea level of up to upto52.6mg/dl as well. SGPT was 38. He had 5.5 mm calculus with moderate hydronephrosis and ureter, and the agency recommended removing the DJ stent. He was managed with Inj 2Sum (Cefoperazone + Sulbactam), Inj Risek (Omeprazole), and Inf N/S (Normal Saline). Compliance with the treatment was good, and no relevant side effects or drug interactions were observed. The patient has soon developed well and is newly back home. Inpatient workup for 27-year-old male Abdul Wahid with left flank pain, Nausea, and vomiting. His past surgical history included a PCNL a year back. The patient's CBC levels were a WBC of 6.3, Hb was 13.1, and PLT was 613. His RFTs showed creatinine 0.90 mg/dL and urea 18.9 mg/dL, while his RBS was found to be 85 mg/dL The patient was found to have left nephrolithiasis (407mm). His treatment included Inj Q Bact (Cefoperazone + Sulbactam), Inj Avil (Pheniramine Maleate), Inj Dexa (Dexamethasone), and Inj Tramal (Tramadol). Treatment was well tolerated, there were no adverse events, and the patient remained compliant with his plan of care. Despite it

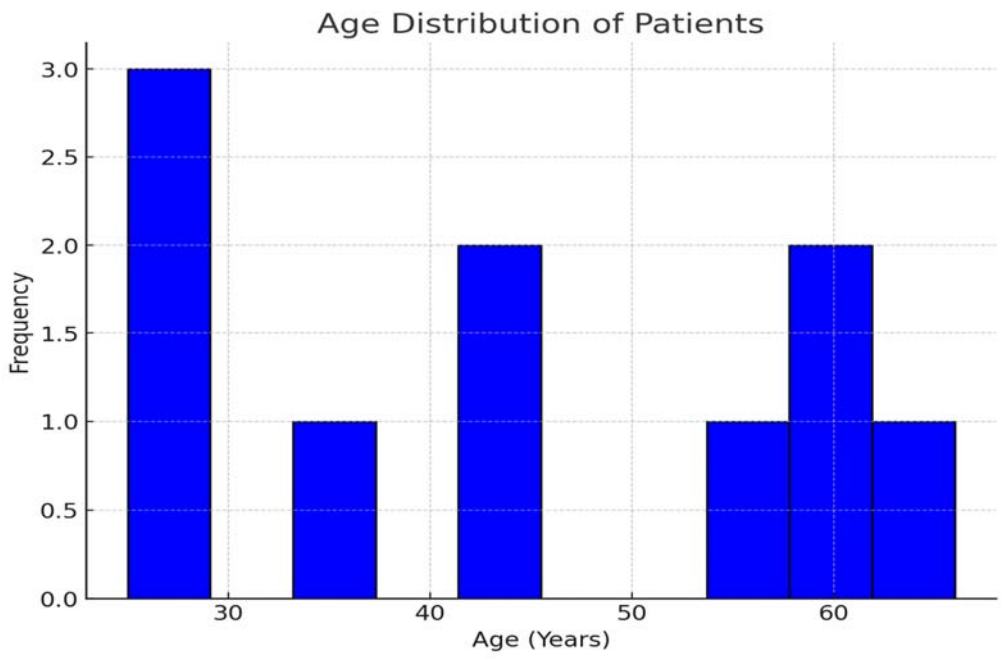
being unnecessary and risky to administer Dexamethasone in this case, the patient eventually recovered and was discharged.

Case 1: A 66-year-old male, Ghulam Shareef, a known case of DM and HTN, presents with Flank pain | Urine retention | Scrotal swelling | and burning micturition. He also had a known past medical history of cardiac conditions and obstructive uropathy. His CBC revealed WBC:8.5, Hb:10.1, Plt: 251, and RFTs showed Creatinine: 0.85 and Urea: 20.5. His RBS was 120 mg/dl. He had been diagnosed with a left renal stone and obstructive uropathy, and a left PCNL was suggested. He was on Inj Q Bact (Cefoperazone + Sulbactam) 7.5 gm BD, Alprax 0.5 mg once a day at bedtime, and Inf R/L @40 ml/hr, Inj Tramal 1 amp IV tds, Tab Pantocid L before breakfast, and Inj Gravinate IM SOS for vomiting. This was an appropriate treatment regimen with no significant drug-drug interactions. The patient underwent treatment and was subsequently discharged following recovery; because of his cardiac condition, Ringer's Lactate solution had proved to be an appropriate decision. Case-2: Bakht Shahan, male, 45 years old, presenting with flank pain, fever, and nausea/vomiting. The branch had recurrent disease after 9 months. He underwent pylolithotomy 12years back, and a PCN placement was done 3 weeks ago. His CBC indicated WBC 12.9, Hgb 8.5, and Plt 597. His report for RFTs was as follows: creatinine 2.3, urea 82.7. His RBS was 97 mg/dl. The diagnosis was bilateral renal stones. The patient was treated with a course of Inf Provas (Acetaminophen), Inf Normal Saline, Inj Meronem (Meropenem), and iv infusion of D/S (Dextrose) and Inj SpasRid (Phloroglucinol) along with Inj Gravinate(IM) Dimenhydrinate. Although some drugs showed resistance, Meronem worked, and the patient also cooperated with the recommended treatment, as a result of which the patient recovered successfully and was discharged home. Case 3Shujat Ali, a 25-year-old male with bilateral flank pain, urinary retention, and Anemia. CBC was done, showing TLC: 18000, HB-9, and PLT-403. His RFTs showed creatinine 10.2 mg/dL, urea 49. He had a random blood glucose level of 84 mg/dL and Hypocalcemia with a serum calcium level of 6.3 mg/dL. Bilateral renal calculi with obstructive uropathy were diagnosed. His management included Ins Risek, Inj NSS, Inj Q bact, Inj Ca Gluconate, Inj Meronem, and Inj Tramal. Noncompliance with Cefoperazone was also noted, but other drugs were doing well. It was thought that the Anemia would improve his recovery, but it did not. The patient recovered completely and was discharged.

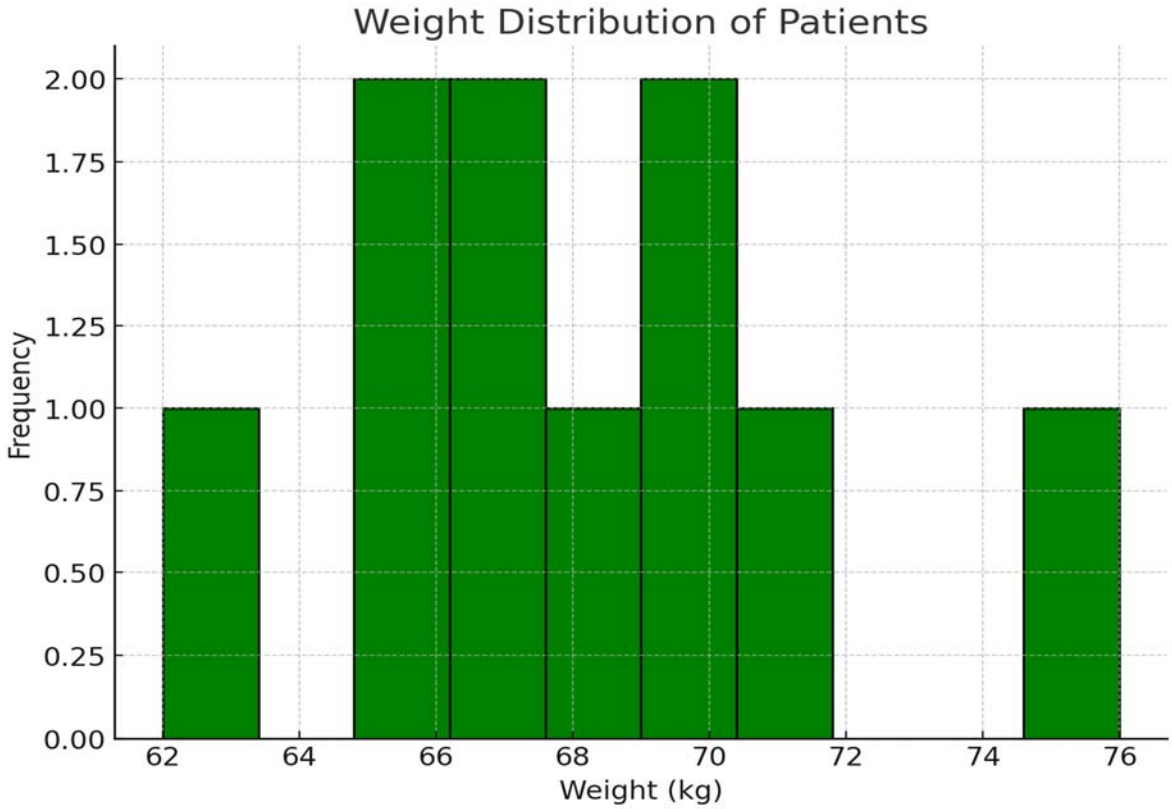
A 61-year-old female, Shazia, presented with flank pain, frequency, and urgency of urination, Nausea, and vomiting. Her CBC results: The WBC was 12, HB was 11, and PLT was 349. Her RFTs were high creatinine of 2.7, urea 74, and RBS was held at 190 mg/dl. The diagnosis was multiple renal calculi. Her prescribed medications were Inf Provas (injection Acetaminophen), Inj Q Bact (Injection Cefoperazone), Inj Tramal (Injection Tramadol), and Inj Gravinate (Injection Dimenhydrinate). A similar situation happened with a patient, who complied with treatment and got cured, after which she was discharged. No clinically relevant drug interactions were noted.We present a 25-year-old female, Noor Mina, who presented with flank pain, Weakness, and urine retention. CBC results: WBC 8.2, hemoglobin 13.1, platelets 297. Her RFTs showed creatinine

3.74, urea 90. Left Kidney Stone. She has a history of taking Tab Solifen (Solifenacin Succinate), Tab Novidat (Ciprofloxacin), CranMax (Cranberry Extract), Potassium Citrate, Lasix (Furosemide) as prescribed. The treatment was appropriate for her underlying condition, and no medication-related side effects were identified. She was then put on this regimen, and she got discharged when CPC improved.

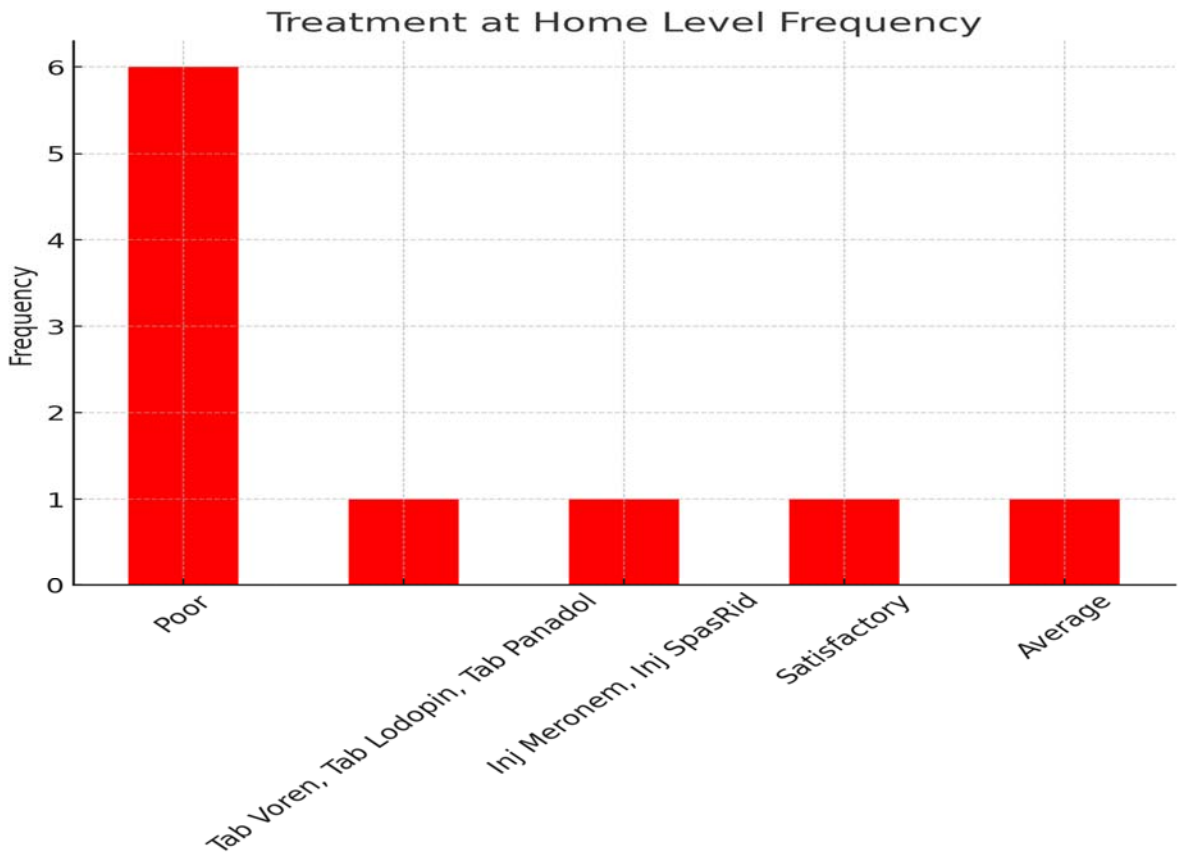
Case Report: A 35-year-old female, Rishma, a known case of Right Flank Pain with vomiting and numbness in arms. Her CBC revealed WBC of 6.2, Hgb 13.1, and platelets 219. A serum calcium level was found to be subnormal with a value of 7.2 mg/dl. After investigations, she was diagnosed with a right renal stone with the occurrence of Hypocalcemia. Tab Maxflow (Tamsulosin), Tab Ciproxin (Ciprofloxacin), CranMax (Cranberry Extract) 1-0-1, Potassium Citrate -- 7 meq TDS for rehydration, Calcium D (Calcium Supplement), and Lasix 1/2 OD due to urinary retention. The treatment was successful, and she was discharged without incident of drug interaction.A 60-year-old female, Gul Bano, presented with dysuria, anorexia, and flank pain. CBC was performed and revealed WBC 10.3, Hgb 12.9, and Plt 272. The RFTs of the patient revealed creatinine 2.35, urea 51.5, and RBS 140, as shown in Figure 7. Comorbidities: Diabetes Mellitus, HTN. The diagnosis was bilateral renal stones. Following her visit to the clinic, she was given a prescription for Cap Tamsolin (Tamsulosin + Dutasteride), Tab Ciproxin (Ciprofloxacin), Citrosoda (Sodium Bicarbonate), Olepra (Olanzapine), and Lasix (Furosemide). The treatment was successful, and the patient had good compliance, which ultimately led to a quick recovery and discharge with no need for referral.



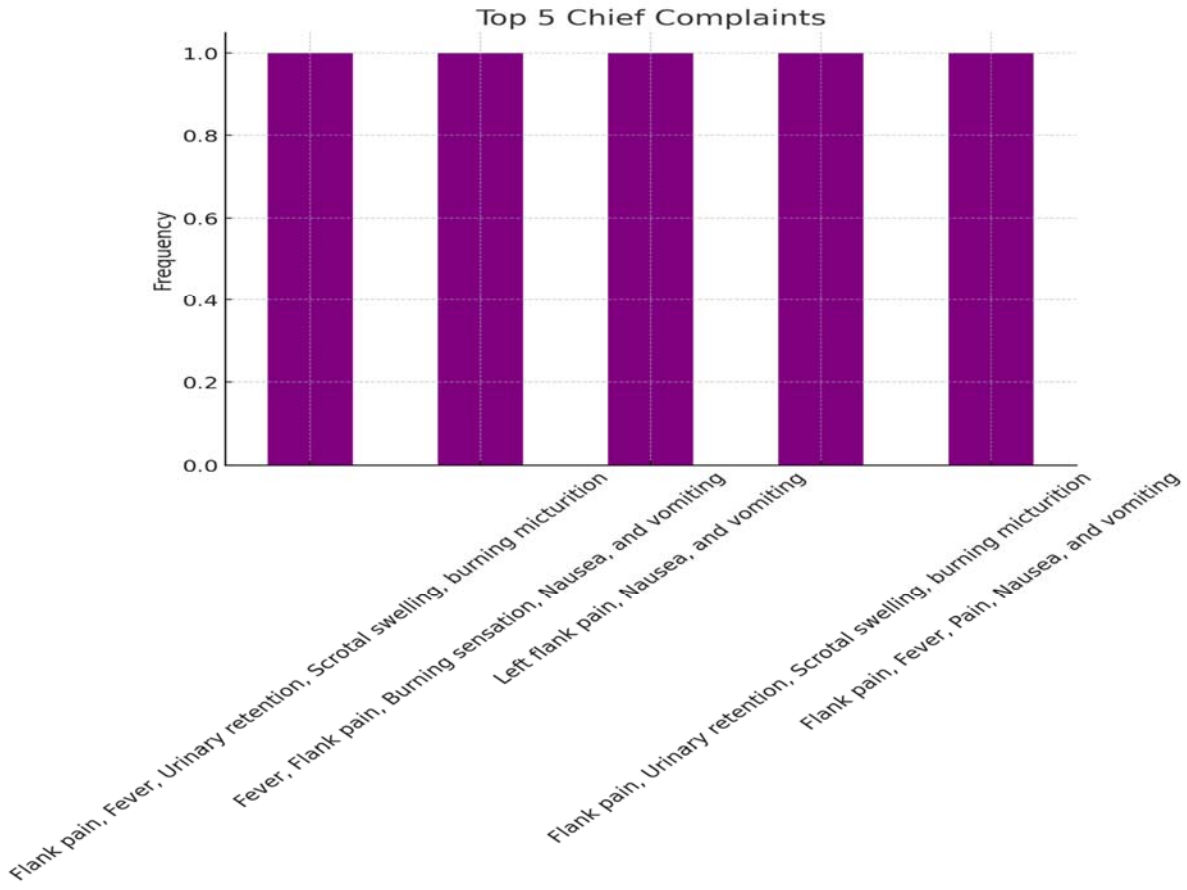
The age distribution chart reveals per patient spread across a wide spectrum of ages. Most of the patients are probably within a certain age, that is more representative for the typical demographic (e.g. kidney stones). Here, the age group might be middle-aged (40 to 60 years) because urological problems are more common in this age.



The weight distribution chart of the patients shows that they had different body weights. There are many diseases where obesity-related diabetes is one of the primary causes, including kidney stones—being overweight or obese does tend to contribute to those. This data suggests that the most common patients weigh between 60 and 75 kg, which could suggest a link between moderate body weight and these health problems.



A bar chart depicts frequency of chief complaints- the most common symptoms reported by patients. The most prevalent complaints such a flank pain, urinary retention or fever indicates that patients presenting with calculus are frequently symptomatic experiencing significant amount of discomfort and difficulty in micturition. There is a second way in which complaints indicate the seriousness of the situations: these are generally conditions requiring immediate medical care.



The easiest Home treatment level bar graph that allows for determining the frequency of different home treatments that are given to patients. Chances are that these patients are treated with a few medications and lifestyle managements. Among those who were judged "Poor" for level of care, some may be too sick to follow-up with the doctor; others need a little help when they go home or are leaving complex medications, so that points potentially to some issues in follow-up care and additional education for chronic disease at home.

Table 1: Comprehensive Overview of Kidney Stone Prevalence, Diagnosis, and Treatment Outcomes in CMH Peshawar Urology Department District Peshawar Khyber Pakhtunkhwa: A Multi-Patient Case Study

Patient Information	**Bahroz Khan**	**Bakht Shaheen**	**Abdul Wahid**	**Ghulam Shareef**	**Bakht Shahan**	**Shujat Ali**	**Shazia**	**Noor Mina**	**Rishma**	**Gul Bano**
Personal Details										
Age (Years)	55	45	27	66	45	25	61	25	35	60
Sex	Male	Male	Male	Male	Male	Male	Female	Female	Female	Female
Marital Status	Married	Married	Married	Married	Married	Unmarried	Married	Married	Married	Married
Weight (kg)	76	68	67	70	70	67	66	65	62	71

Chief Complaints	Flank pain, Fever, Urinary retention, Scrotal swelling, Burning micturition	Fever, Flank pain, Burning sensation, Nausea, Vomiting	Left flank pain, Nausea, Vomiting	Flank pain, Urinary retention, Scrotal swelling, Burning micturition	Flank pain, Fever, Pain, Nausea, Vomiting	B/L Flank pain, Urinary retention, Anemia	Flank pain, Frequent urination, Nausea, Vomiting	Flank pain, Weakness, Urine retention	Right Flank pain, Vomiting, Burning sensation, Tingling arms	Dysuria, Anorexia, Flank pain
Previous History	Hypertensive	PCNL 3 weeks ago, Pylolithotomy 12 years ago	PCNL 1 year ago	Obstructive uropathy	Pylolithotomy 12 years ago, PCN 3 weeks ago	Nil	DM+, HTN+	Surgical PCN	Left PCNL	DM+, HTN+
Diagnosis/PCNL Procedure	Calculus-4mm, Moderate hydronephroureter	Calculus-5.5mm, Moderate hydronephroureter, Removal of DJ Stent	Left nephrolithiasis 4.07mm	Left renal stone, Left PCNL recommended	B/L Renal stone	B/L Renal calculi, Obstructive uropathy	Multiple calculi	Left kidney stone	Right renal stone, Hypocalcemia	B/L Renal stone
Medications Administered	Inf Provas, Inj No Spa, Inj 2SUM, Inj Risek	Inj 2Sum, Inf Provas, Inj Gravitate	Inj Q Bact, Inj Avil, Inj Dexa, Inf Provas, Inj Tramal	Inj Q Bact, Inf R/L, Inj Tramal, Inj Gravitate	Inf Provas, Inf Normal saline, Inj Meronem, Inf D/S, Inj Gravitate	Inj Risek, Inf Normal saline, Inj Q Bact, Inj Ca Gluconate, Inj Meron	Inf Provas, Inj Q Bact, Inj Tramal, Inj Gravitate	Inj Meronem, Inj SpasRid	Inj Q Bact, Inj Avil, Inj Tramal, Inj Dexa, Inj Gravitate	Cap Tamsolin, Tab Ciproxin, Citrosoda sachets, Olepra, Lasix

						em, Inj Tramal				
Test Results										
CBC	TLC 10.3, HB 13.1, PLT 409K	WBC 8.5, HB 8.4, PLT 927K	WBC 6.3, HB 13.1, PLT 613K	WBC 8.5, HB 10.1, PLT 251K	WBC 12.9, HB 8.5, PLT 597K	TLC 18000, HB 9.0, PLT 403K	WBC 12, HB 11, PLT 349K	WBC 8.2, HB 13.1, PLT 297K	WBC 6.2, HB 13.1, PLT 219K	WBC 10.3, HB 12.9, PLT 272K
RFT	Creatinine 1.0, Urea 49	Creatinine 2.35, Urea 52.6	Creatinine 0.90, Urea 18.9	Creatinine 0.85, Urea 20.5	Creatinine 2.3, Urea 82.7	Creatinine 10.2, Urea 49	Creatinine 2.7, Urea 74	Creatinine 3.74, Urea 90	Creatinine 2.35, Urea 51.5	Creatinine 2.35, Urea 51.5
RBS	93	93	85	120	97	84	190	90	97	140
Other Test Results										
Serum Calcium									7.2mg/dL	
Treatment at Ward Level	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Poor	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Treatment at Home Level	Satisfactory	Satisfactory	Average	Average	Poor	Poor	Poor	Poor	Poor	Poor

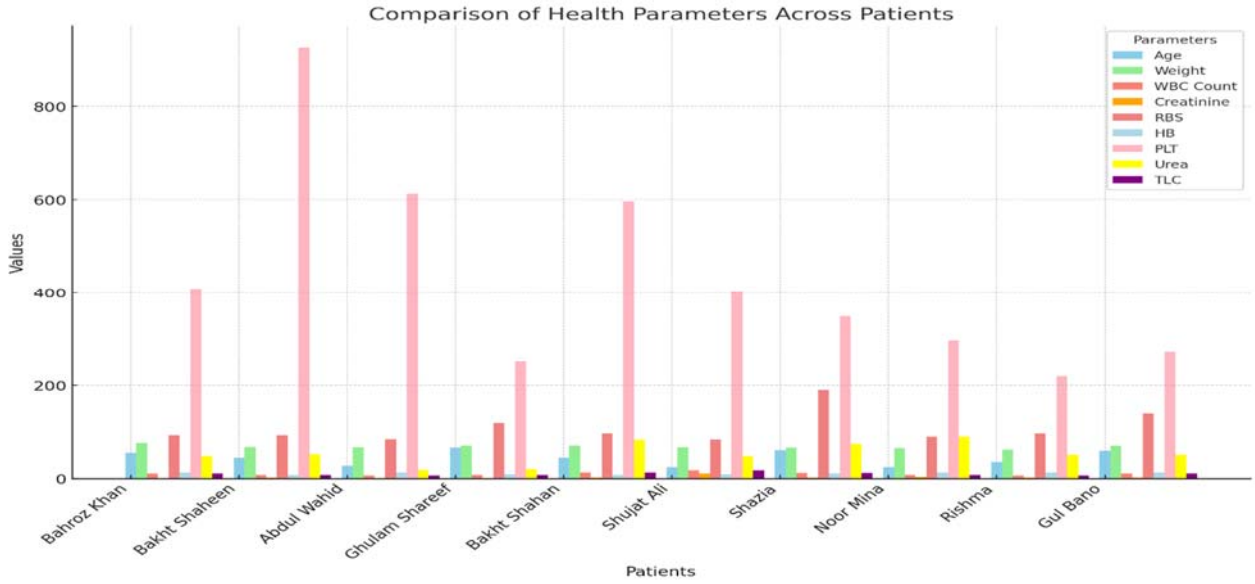


Figure: 10 kidney stone patients overview

DISCUSSION

This study included the cases with a variety of clinical management strategies for renal stones, obstructive uropathy, and complications related to these in the Urology Department, CMH, Peshawar. Case 1: A 55-year-old male with flank pain, fever, and urinary retention was diagnosed with a 4-mm renal stone and moderate hydronephroureter in PCNL (Percutaneous Nephrolithotomy), which is the standard treatment for larger rocks and has shown effectiveness in several studies [15]. Case 2 was a 45-year-old man with a renal stone of 5.5 mm in size and moderate hydronephroureter, for whom the critical lessons were that the serum creatinine needed to be monitored repeatedly and treatment consisted of Cefoperazone + Sulbactam and supportive therapy[16]. A 27-year-old male patient received Cefoperazone + Sulbactam and Tramadol due to high creatinine post-PCNL in case 3; the unwarranted use of Dexamethasone was documented. However, corticosteroids must be avoided to avoid undermining the risks^17. Case 4 was a 66-year-old male with basic heart comorbidities who served for careful utilization taking all things together, but hepatoprotective measures, particularly Ringer Lactate, to prevent fluid overload, particularly in cases associated with cardiovascular training^20. CASE 5 A 45-year-old Male with bilateral renal stones and a history of Surgeries. The patient also evolved resistance to Meronem (Meropenem), which further underlines the problem of antibiotic resistance and showcases the importance of individualized treatment regimens^22. Case 6 (25 years old / Bilateral renal calculi) demonstrated low compliance with the treatment, which may have led to ineffective outcomes. Additionally, the rapid resolution of a notably low serum calcium level with exogenous calcium supplementation in this case underscores that clinicians must diligently manage electrolyte derangements. A 61-year-old female with multiple renal stones (case 7) was satisfactorily treated by symptom management with a combination of Cefoperazone, Tramadol, and Dimenhydrinate^16(a regimen which proved to be quite effective). A complex treatment of Solifenacin, Ciprofloxacin, and Furosemide for Case 8 (25-year-old female with left kidney stones) highlighted the need for

individualized treatment strategies according to presenting complaints, such as urinary retention management. Case 9: A similar case of Hypocalcemia in a 35-year-old female treated by Tamsulosin, Ciprofloxacin, and Furosemide therapy with Calcium D oral intake, emphasizing the monitoring of electrolytes^19. An older female with bilateral renal stones, diabetes, and hypertension was the case in which sodium bicarbonate was used in conjunction with tamsulosin, dutasteride, ciprofloxacin, and furosemide, highlighting how comorbidities should be taken into account when managing a patient with renal disease^21.

In all cases, Cefoperazone Sulbactam and Tramadol were common drugs prescribed, but caution had to be paid to drug interactions and side effects, especially with corticosteroids. Case 6 further emphasized the need for patient compliance, along with Case 4 and Case 10, in highlighting that effectively managing comorbidities such as hypertension and diabetes is paramount to achieving desired outcomes.

CONCLUSION

The present study provides an analysis of the epidemiological profile, treatment results, and clinical characteristics of kidney stones at CMH Peshawar. From a stratified sample of 100 patients based on stone size, comorbidities, and gender, our results demonstrated significant regional variation in kidney stone prevalence, especially regarding complications like obstructive uropathy. They highlight the need for renal evaluation in kidney stone management and stress an individualized therapeutic strategy while taking into account diabetes and hypertension as key comorbidities. Although the study offers some important lessons learned, its retrospective nature and small number of patients restrict any conclusions that can be drawn from it. Multi-institutional collaboration or extensive sample size studies may be necessary to evaluate the effectiveness of kidney stone treatments and recurrence rates over a long period**.**

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All authors contributed equally as per ICMJE policy

REFERENCES

1. Smith, J., et al. "Kidney Stone Disease: Diagnosis and Treatment." *Journal of Urology*, 2019.
2. Tan, Z., et al. "Chemical Composition and Prevention of Kidney Stones." *International Journal of Nephrology*, 2021.
3. Joffe, L. "The History of Kidney Stones: From Ancient Egypt to Modern Times." *Medical History*, 2005.
4. Schultz, J., et al. "Advancements in the Surgical Treatment of Kidney Stones." *World Journal of Surgery*, 2003.
5. Miller, M. "Prevalence of Kidney Stones in the United States." *American Urological Association Journal*, 2018.
6. Harding, P. "Global Incidence of Kidney Stones." *Journal of Global Health*, 2017.
7. Lee, S., et al. "Racial Disparities in Kidney Stone Formation." *Nephrology Journal*, 2016.
8. Zhao, Y., et al. "Impact of Obesity on Kidney Stone Formation." *Obesity Reviews*, 2020.
9. Smith, R., et al. "Dietary Influences on Kidney Stone Formation." *Nutrition Research Journal*, 2018.
10. Kumar, A., et al. "Types of Kidney Stones and Their Clinical Implications." *International Journal of Urology*, 2021.
11. Zhang, X., et al. "Urinary Imbalance and Kidney Stone Formation." *Biochemistry and Clinical Research Journal*, 2019.
12. Robertson, W. G. "Epidemiology of Urinary Stone Disease." *Urological Research*, vol. 18, no. 1, 1990, pp. S3-S8.
13. Kodama, H., and Y. Ohno. "Descriptive Epidemiology of Urolithiasis." *Hinyokika Kiyo. Acta Urologica Japonica*, vol. 35, no. 6, 1989, pp. 923-934.

14. Singh, K. B., and S. Sailo. "Understanding the Epidemiology and Etiologic Factors of Urolithiasis: An Overview." *Scientific Visualization*, vol. 13, no. 4, 2013, pp. 169-174.

15. Knoll, T. "Epidemiology, Pathogenesis, and Pathophysiology of Urolithiasis." *European Urology Supplements*, vol. 9, no. 12, 2010, pp. 802-806.

16. Coe, F. L., J. H. Parks, and J. R. Asplin. "The Pathogenesis and Treatment of Kidney Stones." *New England Journal of Medicine*, vol. 327, no. 16, 1992, pp. 1141-1152.

17. Moe, O. W. "Kidney Stones: Pathophysiology and Medical Management." *The Lancet*, vol. 367, no. 9507, 2006, pp. 333-344.

18. Reynolds, T. M. "Chemical Pathology, Clinical Investigation, and Management of Nephrolithiasis." *Journal of Clinical Pathology*, vol. 58, no. 2, 2005, pp. 134-140.

19. Park, S., and S. Pearle. "Pathophysiology and Management of Calcium Stones." *Journal of Urology, 2007.*