ORIGINAL ARTICLE

THE PREVALENCE OF NEGLECTED RENAL STONE AMONG PATIENTS PRESENTED WITH ACUTE KIDNEY INJURY TO A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine the frequency of neglected renal calculi in patients with acute kidney injury.

Material and Methods: This was a descriptive study conducted at the division of nephrology, Lady Reading Hospital Peshawar, from 26/09/2021- 26/03/2022. Data was collected from 214 patients with acute kidney injury (AKI). Detailed clinical history was taken to confirm the patient did not know about the presence of previous stone disease. After confirming the acute kidney injury, bio-chemical investigations including serum urea, serum creatinine, serum calcium, urine analysis, and radiological investigation i.e. ultrasound KUB, X-ray KUB. When needed IUV and CT scan KUB was also done for the confirmation of the renal stones.

Results: In this study, the mean age was 52 years ± 13.81. Sixty-seven percent of patients were male, while 33% were female. Twelve percent of patients had neglected renal calculi, while 88% of patients didn't have neglected renal calculi.

Conclusion: Our study concluded that 12% of patients presented with Acute Kidney Injury at a tertiary care hospital had neglected renal stones.

Keywords: Neglected, renal calculi, Acute Kidney Injury.

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INTRODUCTION

A kidney stone is a solid mass formed due to the concentration of particles in the urine mostly due to metabolic abnormalities. Stone may stay in the renal parenchyma or travel down the urinary tract. [1] Kidney stone disease is more common in the general population i.e. almost affecting 1 in 11 individuals in the United States at some point in their lives and the numbers are still on the rise. [2] While in India, 12% of the population is estimated to have this disease and among them, 50% may get renal impairment at some stage of life. [3]

The incidence of calculus disease is on an increase worldwide affecting 12% of the population in Pakistan. Compared to the rising trend of this disease the treatment modalities for this disease fail to increase with the parallel speed leading to a discrepancy between the disease and the treatments. [4] Renal stone disease is more prevalent and an important cause of obstructive uropathy/nephropathy in our country and affects all age groups. [5] Unfortunately, above all the neglected renal calculi, has surfaced as another entity putting physicians and families in a mess along with the increasing misery to the patient and financial burden on the hospital resource because of late presentations of patients and complications related to it. [6]

These neglected renal stones remain a problem for countries like Pakistan as it increases the risk of renal impairments. Otherwise, uncomplicated stones can be easily managed with different noninterventional or interventional techniques. [7] Local studies show neglected and poor health infrastructure lead to acute kidney injury (AKI) in many cases. In another local study, among 278 patients, 12% were reported to have had AKI due to neglect or delay in diagnosis of renal stones and their first presentation was with AKI. Other reasons also contributed to the delay in presentation to a tertiary care unit as followed up with family physicians (19%), hakims, homeopaths, quacks (24%), and dentists (45%). Sometimes this delay has a high mortality of 10.4%, reflecting a loss of human life. [4]

Kidney stone disease is more common in men (10.6%) as compared to women (7.1%) while 8.8% of

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people in 20007-2010 had self-reported a kidney stone as mentioned in a recent National Health and Nutrition Examination Survey. [8]

From the review of the literature, it is evident that neglected renal calculi are one of the major causes of renal failure, particularly in developing and underdeveloped countries like Pakistan.

While the literature review also indicates the absence of such studies. The presence of such a gap provides a sound and logical rationale to conduct a study and provide data-based details about the frequency of neglected renal calculi leading to kidney injury in patients presenting to our institute and to also identify the factors contributing towards negligence of renal calculi leading to renal failure.

As research on the topic has not been conducted in our region yet, the outcome of the study will help to design better strategies to combat the problem. Furthermore, the findings of the studies will contribute to the body of literature and future courses about this disease.

MATERIAL AND METHODS

This study was carried out at the division of nephrology, Lady Reading Hospital Peshawar, from 26/09/2021- 26/03/2022, in an age group between 18-90 years of both genders. In this study, data was collected from 214 patients with acute kidney injury. Clinical history was taken to confirm the patient did not know about the presence of previous stone disease.

After confirming the acute kidney injury, biochemical investigations (including serum urea, serum creatinine, serum calcium, and urine analysis) and radiological investigation i.e ultrasound KUB, X-ray KUB, and when needed IUV and CT scan KUB were done. While patients with renal transplant (KT), end-stage renal disease (ESRD), and patients already diagnosed with kidney disease or known renal calculus disease without renal injury and admitted to the hospital for any other reason were excluded from this study. Patients with other causes of kidney injury e.g. liver diseases, urethral obstruction, vasculitis, gastroenteritis, glomerulonephritis (GN), pelvic malignancy, and lower urinary tract were excluded.

RESULTS

A total of 214 patients were included in this study. Among which 139 (65%) were in the age range 18-40 years, 58(27%) were in the age range 41-60 years, 17(8%) were in the age range 61-80 years, with a mean age of 52 years ± 13.81. While 143(67%) patients were male and 71(33%) were female.

Among 214 patients, 139(65%) had a weight ≤75 Kgs, while 75(35%) had a weight >75 Kgs and the mean weight was 75 Kgs ± 12.74. Regarding the history of previous treatment, 150(70%) patients had a history of previous treatment for renal stones, while 64(30%) patients didn't have a history of previous treatment for renal stones. Regarding the history of drug intake, 148 (69%) had a drug history, while 66 (31%) had no history of drug intake in the past for this disease (Table no.1).

Family history of a first-degree relative on dialysis or with KT among 214 patients was analyzed as 54(25%) had a family history of a first-degree relative on dialysis or with KT, while 160(75%) didn't have a family history of a first degree relative on dialysis or with KT. Neglected renal calculi among 214 patients, were analyzed (Table no.1).

Stratification of neglected renal calculi with age, weight, sex, past/present history of treatment, drug history, and family history is given (Table no. 2 and 3).

Table 1: Patients Demographics

	Age			Gender		Weight		History of treatment		History of Drug		Family History		Neglected Renal Calculi	
	18-40 Years	41-60 Years	61-80 Years	Male	Female	≤75 Kgs	>75 Kgs	Yes	No	Yes	No	Yes	No	Yes	No
Frequency	139	58	17	143	71	139	75	150	64	148	66	54	160	26	188
Percentage	65%	27%	8%	67%	33%	65%	35%	70%	30%	69%	31%	25%	75%	12%	88%

Table 2: Stratification of neglected renal calculi according to age, gender, weight

	Age						Gender				Weight			
	40-18 Years		60-41 Years		80-61 Years		Male		Female		≤75 Kgs		>75 Kgs	
Neglected Renal Calculi	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	17	122	7	51	2	15	17	126	9	62	17	122	9	188
P Value	0.9982						0.8680				0.9607			

Table 3: Stratification of neglected renal calculi according to treatment, history of medications, first degree relative on dialysis

	Treatment of Renal Stones				History of Drug in take				First Degree Relative on dialysis / transplant			
	Yes		No		Yes		No		Yes		No	
Neglected Renal Calculi	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	18	132	8	56	18	130	8	58	7	47	19	141
P Value												

DISCUSSION

The mean age of the patients in this study was 52 yrs ± 13.81. Sixty-seven percent were male while 33% were female. Moreover, the frequency of neglected renal calculi was 12% in patients with renal injury presenting to a tertiary care hospital in Peshawar.

As per international data of NHANES, the prevalence is more in men and the prevalence of self-reported kidney stones is more in the general population. [8] Similar results were observed in a study conducted by Mahmud HM et al, in which 152 patients with ureteric stones underwent a urological decompressive surgical procedure. AKI was present in 49 (32.2%) of patients with these neglected renal stones and those with AKI were found to be of higher age, increased weight, bilateral stones, lower ureteric stones, and with co-morbidities in comparison to those who were without AKI. For patients developing AKI, 89.7% recovered either partially (20.4 %) or completely (69.3%). The frequency of neglected renal calculi was 10% in renal injury. [9]

A study conducted by Ching YH et al reported a much different result that among adults only 1-2% of patients with kidney stones had AKI, although it may be totally different in children up to 30%. Obstructive uropathy remains the main factor of renal injury at presentation and a predictive marker for long-term prognosis and recovery. Obstructive uropathy is followed by crystalline nephropathy and has a worse outcome in regard to prognosis. Other factors such as oxalate crystals are key factors for AKI. Recently, several large cohort studies showed an association between kidney stones with CKD and ESRD. The frequency of neglected renal calculi was 8.2% in renal injury. Urological diseases, urinary tract infections, and shared underlying risk factors (e.g., diabetes, hypertension) all impact renal stones-associated CKD risk. [10]

In a study by Tang X et al, out of 1919 patients with upper urinary tract stones (UTI), with an average age of 54 ± 13.8yrs, male to female ratio of 2.59: 1, with the stone composition of calcium-containing stones 1736 (90.5%) calcium oxalate mixed with calcium phosphate stones, calcium oxalate stones 579 (30.2%), 204 (10.6%) calcium phosphate stones, and 182 (9.5%) non-calcium-containing stones, of which 21 (1.1%) were struvite stones 161 (8.4%) were uric acid stones. In this study by Tang X et al, the frequency of neglected renal calculi was 8.2% in renal injury. Calcium stones with oxalate mixed with phosphate followed by uric acid and struvite stones remained the predominant calcium stones in different studies. When renal functions were analyzed in regard to the stone composition it was obvious that calcium oxalate mixed with calcium phosphate had the highest eGFR: 73.4 ± 22.6 mL/min/1.73 m^2 in contrast to patients with uric acid stones who had the lowest eGFR: 54.1 ± 17.1 mL/min/1.73 m^2. The eGFR values were 67.0 ± 23.7 mL/min/1.73 m^2, 70.3 ± 21.5 mL/min/1.73 m^2, and 54.9 ± 18.6 mL/min/1.73 m^2 in patients with calcium phosphate, calcium oxalate, and struvite stones, respectively. It is clearly shown that the patients with calcium-containing stones (calcium phosphate and calcium oxalate) had significantly better renal function compared with those with non-calcium-containing stones (struvite and uric acid, $p < 0.01$). [11]

Due to a small sample size and single-center study, the results of this study may not be reflecting the true prevalence of this condition. Multicentre epidemiological studies of this kind may be conducted to determine the true prevalence of neglected renal stones in our population.

CONCLUSION

Our study concludes that the frequency of neglected renal calculi was 12% in patients with renal injury presenting to a tertiary care hospital in Peshawar.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Bukhari H:	Idea and writing of the manuscript.
Ikram M:	Data analysis and statistical analysis.
Muhammad S:	Data collection
Muhammad N:	Supervision of the study and data collection.
Iqbal M:	Assistance in manuscript writing
Ahmed R:	Correction and re-writing corrections.
Sajidullah:	Data collection and compilation

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.