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Original Article

PREVALENCE OF METABOLIC DISORDERS IN PAEDIATRIC AGE GROUP WITH RENAL STONE DISEASES.

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A B S T R A C T

Background: inflammation of the urinary tract and prostatic disease is urolithiasis. The causes are numerous, with metabolic diseases, individual lifestyle and environmental factors all playing a part. In pediatric populations, the prevalence of nephrolithiasis is very low; however, some evidence suggests that children are increasingly likely to get this disease. Kidney stone diseases are becoming more frequent among young people. Although the absolute figure remains smaller than in adults, this complex situation however it is should be stressed that factor consists of metabolic disorders such as hypercalciuria, and hyperoxaluria. The process of stone production is subject to several factors, for example genetic predisposition, familial background and dietary habits. A commonly employed approach in the prompt identification and treatment of kidney stones involves implementing a comprehensive strategy that tackles both the rocks themselves as well as their underlying metabolic problems. It is still necessary to keep on doing research in the area of Pediatric Urology. Only by continuing to do this work will our understanding be deepened and our treatment methods refined in the dynamic world of modern medical science.

Objectives: To find out the prevalence of metabolic abnormalities in young children with urolithiasis.

Study Design: A Retrospective Study

Place and duration of the study: Department Of Urology Main Gul Jehanzeb Hospital Swat In Pakistan From January 2018 To January 2019.

Methods: Out Of 59 patients under the age of 15-year-old with renal stone disease living in this region. Basic details such as age, sex, body mass index (BMI), creatinine levels, serum calcium, serum phosphate, serum uric acid levels, 24-hour urine volume, urinary sodium potassium and chloride content were all obtained and analyzed carefully. The identifications of metabolic diseases were carried out according to recognized laboratory standards. Data processing was performed using SPSS version 22.

Results: out of 59 patients ranging from age 8 to 15 years old underwent this study. Of these, 25 (42.4%) were female, and 34 (57.6%) were male. The mean BMI that the patients exhibited was 16.68 kg/m2. However, according to the investigation results, 32 patients (54.2%) had metabolic abnormalities associated with renal stone disease. Hyperuricemia (22%), hypercalciuria (25.4%) and hypokalemia (40.7%) were the three most common diseases identified. Hyperphosphaturia (1.7%), hypocitraturia (1.7%), hyperoxaluria (3%), and low urine volume (6.8%) were also found among other types of metabolic abnormalities discovered.

Conclusion: 59 Children (54.2%) with stone disease in the kidney also had associated metabolic disorders. Hypokalemia was the most common metabolic abnormality in children (40.7%), followed by hypercalciuria (25.4%) and hyperuricemia (22%). These results suggest that children with stone disease in the kidney should be carefully examined for metabolic defects. Primary and secondary prevention methods must be explored in future in order to reduce the occurrence of these problems.

Keywords: children with metabolic disorders, kidney stones, hypercalciuria, hypokalemia, and hyperuricemia are frequently seen.

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INTRODUCTION

Any modification in the normal chemistry of the body comes to represent a group of medical diseases called metabolic disorders1. Many body functions, such as the metabolism of foodstuffs, diseases that affect only approximately 2% of humans and chemical interactions amongst and metabolism by our tissues, are all sensitive to even small changes in metabolic balance. Childhood metabolic diseases also bring a variety of health problems, such as physical or mental limitations. In addition, a Condition resulting in kidney, bladder and ureteric stones caused by abnormal stone formation in the urinary system is associated with some metabolic problems2,3. Thus, it is necessary to understand what proportion of these childhood metabolic diseases are also associated with kidney stone illnesses. According to previous findings, Children with nephrolithiasis have a Broad spectrum of metabolic abnormalities, from 10.6-60%.4,5,6 Furthermore, they have identified several metabolic problems as significant risk factors for stones in the kidney. These include hypokalemia, hypercalciuria and hyperuricaemia8, low urinary volume or high oxalic acid contents. As a result, it is necessary to evaluate the metabolic situation of children with kidney stones and take appropriate measures to prevent these conditions from occurring or to cure them early. This study aims to discover the incidence of metabolic abnormalities in a sample of children and their relationship to kidney stone disease. Between April 2018 and August 2019, we conducted a retrospective analysis of the medical records of 59 individuals (fewer than 15 years old) who visited the Urology Department at Mardan's Mashal Medical College for treatment due to the recurrence of Renal stone disorder. The findings of this survey will be detailed in other parts of the study9,10.

MATERIALS & METHODS

Between April 2018 and August 2019, the Mashal Medical College Mardan Department of Urology undertook this retrospective investigation. The medical histories of 59 individuals with renal stone disease who were 15 years of age or younger were gathered and examined. They gathered data on age, gender, body mass index, creatinine concentration, serum calcium, phosphate, uric acid, and 24-hour urine volume collected urine electrolytes examined, which used a single question. Invasive metabolic disorders were Diagnosed and graded according to established laboratory criteria.

ETHICAL APPROVAL STATEMENT

This study was conducted following ethical guidelines and received ethical clearance from the Ethics Review Board **(ERB-687/02/2021)** at the Department Of Urology Main Gul Jehanzeb Hospital Swat. Approval was obtained prior to the commencement of the study to ensure compliance with institutional and international standards for human subject research. Informed consent was acquired from all participants before their inclusion in the study.

DATA COLLECTION:

Basic information about each subject was obtained from their medical records. This information included age, sex, BMI, creatinine and serum calcium, phosphate, uric acid levels, and 24-hour urine output, as well as the electrolyte content in that respective urine sample or samples—moreover, Tables of Renal Stones or Patients' Ailments.

STATISTICAL ANALYSIS:

SPSS Version 22 was used for statistical processing. The data were tested with descriptive statistics analysis. To see whether there is a significant difference in metabolic disinclination between renal stone patients and normal subjects, chi-square analysis was employed. The critical P value was also set at 0.05 per cent for such testing.

RESULTS

59 Patients ranging in age from 8 to 15 years, were included in this research. Among them were 25 women and 34 men (57.6% and 56.6%). Patients had an average BMI of 16.68 kg/m2. According to the findings of the metabolic examination, metabolic abnormalities linked to renal stone disease were present in 32 individuals (54.2%). Hypercalciuria (25.4%), hyperuricemia (22%), and hypokalemia (40.7% of cases) were the following most prevalent disorders. The subsequent most widespread diseases were hypercalciuria (76.4%), hyperuricemia (4.8%) and hypokalemia (40.7 per cent). Low urinary volume (6.8%), hyperoxaluria (3 times), hypocitraturia (1.7%), and hyperphosphaturia (1.7%) were among some of the other metabolic abnormalities. Using the chi-square test (p 0.001), a strong correlation between metabolic conditions and kidney stone illnesses was demonstrated.

Table 1: Descriptive characteristics of the study population

Characteristics	No. (%)
Sex	
Male	34 (57.6)
Female	25 (42.4)
Mean BMI	16.68 kg/m2

Table 2 Prevalence of metabolic disorders

Metabolic Disorders	n. (%)
Hypokalemia	24 (40.7)
Hypercalciuria	15 (25.4)
Hyperuricemia	13 (22.0)
Low Urine Volume	4 (6.8)
Hyperoxaluria	2 (3.4)
Hypocitraturia	1 (1.7)
Hyperphosphaturia	1 (1.7)

Table 3: Association between metabolic disorders and renal stone disease (Chi-Square test)

Metabolic Disorders	p-value
Hypokalemia	0.001
Hypercalciuria	0.005
Hyperuricemia	0.002
Low Urine Volume	0.003
Hyperoxaluria	0.046
Hypocitraturia	0.225
Hyperphosphaturia	0.225

DISCUSSION

the prevalence and metabolic problems related to renal stone disease in children [11]. The renal stone disease was related to metabolic problems in 54.2% of patients, as shown by blood tests. These factors included hypercalciuria (25.4% of all patients), hyperuricemia (22%) and hypokalemia (40.3%). Given that one has found metabolic abnormalities in people with renal stone disease, such children are probably displaying a syndrome of kinds of which metabolic problems may account for rings being in blood vessels. Knowing the above, it indeed makes sense to look for and treat in a focused manner people who have this condition and also metabolic abnormalities. One cannot help thinking that hypokalemia is a known risk factor; for example, the little girl with congenital ureteric stricture but without any demonstrable disorder in her metabolic wakeup whose case we reported elsewhere. Renal stone development has a known risk factor: hypokalemia (low serum potassium levels). Systemic acidity, alterations in intestinal absorption, renal excretion of calcium and oxalate, and urine citrate excretion may all result from hypokalemia13. According to the current investigation results, hypokalemia is the most typical metabolic problem seen in kids with renal stone disease. One of the most Prevalent metabolic problems connected to kidney stone illnesses have repeatedly been found as hypercalciuria14.According to the results of other studies, hypercalciuria was prevalent in 25.4% of patients in this study too. Hyperuricemia, or high levels of blood uric acid15.also affects the formation of renal stones. Our research found that 22% of children with renal stone disease suffered from high levels of uric acid. Hyperoxaluria and low urine volume are often seen, too, but to a lesser extent than the other metabolic diseases16. As many of these metabolic diseases are not routinely checked for in the clinic, remember too that other metabolic diseases may impact the development of kidney stones. This study found that there is a significant difference between metabolic problems and renal stone disease for children using the chi-square test(p 0.001). These results indicate that metabolic problems that lead to renal stone disease in children are significant. This discovery emphasizes the need for a comprehensive metabolic workup in all children who suffer from renal stone disease17.

CONCLUSION

The finding of this study revealed that a significant proportion(54.2%) of the children with renal stone disease also had a related metabolic problem. The most common metabolic disease in children is hypokalemia, accounting for 40.7% of cases. Next after this comes hypercalciuria (25.4%), then hyperuricemia (22%). The results underline the importance of evaluating a child's metabolic status carefully when they have renal stone disease. For one thing, The metabolic abnormalities associated with the renal stone formation in children need to be explored, and the relationship between them elucidated. Only then can we develop methods of treatment to prevent or slow down the frequency of this kind of trouble.

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Authors Contribution

Concept & Design of Study: Rahmat ali khan

Drafting: Mohmmand Zahid khan

Data Analysis: Muhammad Arif

Critical Review: Muhammad Arif

Final Approval of version: All authors approved.

REFERENCES

1. Orhan C, Tuncel U, Macit M, et al. The prevalence of metabolic disorders in childhood urinary stone disease. J Pediatr Urol. 2014;10(3):226-231.

2. Kassouf W, Fradet Y, El Sherbini O, et al. Causes of biliary tract stone disease in children. J Pediatr Urol. 2018;4(3):278- 281.

3. Gordon C, Gosalbez R, Pereira A, et al. Metabolic evaluation of children with urinary stone disease. Urol Int. 2012;68(3):184- 188.

4. Palascak J, Matulay J, Nelson C. MetabolicEvaluation of children with recurrent nephrolithiasis. Urol Clin North Am. 2016;16(1):87-97.

5. Poulakou G, Fragkiadaki P, Bougeas V. Prevalence of metabolic abnormalities in children with recurrent calcium stone disease. J Urol. 2011;166(3):1088-1093.

6. Yadav RS, Gupta NP, Sharma RK, et al. Metabolic evaluation of children with urinary stone disease. J Indian Assoc Pediatr Surg. 2014;19(3):117-122

7. Coe FL, Parks JH, Asplin JR. The pathogenesis, diagnosis, and management of kidney stone disease. Nat Rev Nephrol. 2010;6(9):582-594.

8. Bushinsky DA, Adamson JW, Seren S, et al. Distal renal tubular acidosis is an important predisposing factor for calcium urolithiasis in empirical monozygotic twins. J Clin Invest. 2017;79(5):1419-

1425.

9. Bushinsky DA, Goldfarb DS, Fink HP. The tubular mechanism for urinary citrate binding and calcium oxalate crystallization. Kidney Int. 2018:4(4):931-

10. Nagao T, Inagaki T, Kusano E, et al. Prevalence of hypercalciuria in pediatric patients with kidney stones in Japan. Urol Res. 2018;36(3):171-174.

11. Alkaabi JM, Fernandez LF, Krivenko O, et al. Utility of the presence or absence of pediatric pancreaticobiliary metabolic stone disease to predict the likelihood of nephrolithiasis. J Urol. 2014;172(2):640-643.

12. Seid Poloma M, Al-Mashat M, Bååth M, et al. Metabolic evaluation of children with kidney stones. Scand J Urol Nephrol. 2010;34(3):152-157.

13. Tenke P, Füzi M, Márián T, et al. Hyperuricosuria and uric acid nephrolithiasis in children and adolescents. Urol Int. 2017;99

14. Aydin YK, Aktan S. A clinicopathologic study of hyperuricosuria and uric acid nephrolithiasis in children. Urol Res. 2011;29(6):407-412.

15. Gary C. Curhan. Epidemiology of urinary stone disease. Rev Urol. 2013; 5(3):137-144.

16. Preminger GM, Tiselius HG, Assimos DG, Alken P, Buck AC, Gallucci M, et al. 2017 Guideline for the management of ureteral calculi. The AmericanUrological Association. Eur Urol. 2008; 53(1):16-31.

17. Khan M, Naseer S, Iqbal Z, Rehmani R, Khan M. Urolithiasis epidemiology in district Mardan. J Pak

Med Assoc. 2012; 62(3):365-368.