DOI: https://doi.org/10.53350/pjmhs2023175317

ORIGINAL ARTICLE

Investigating Risk Factors for Kidney Stones in Department of Nephrology Saidu Teaching Hospital Swat

SHAH FAHAD[1], MAZHAR UL HAQ[2], MUHAMMAD SHAHID[3], SYED MUNIB[4], FAZLI WAHAD[5]
[1]*Consultant Nephrologist Saidu Teaching Hospital Swat*
[2]*Assistant Prof Institute Of Kidney Diseases Peshawar*
[3]*Consultant Nephrologist DHQ Hospital Batkhala*
[4]*Associate prof institute of kidney diseases Peshawar*
[5]*Consultant urologist dhq hospital btkhala*
Corresponding author: Mazhar Ul Haq, Email:mazhharulhaq655@gmail.com

ABSTRACT

Objectives: The main objective of this study is to investigate the risk factors associated with kidney stones in the Department of Nephrology, Saidu Teaching Hospital, Swat, from Jan 2021 to Jan 2022. Specific objectives of this study are to:

1. Identify and examine the demographic, medical and lifestyle factors of patients with and without kidney stones.
2. Analyze the risk factors for the different types of kidney stones.
3. Determine the relative risk of each risk factor for kidney stone formation.
4. Make suggestions for prevention and management strategies of kidney stone development.

Methods: This study was a retrospective case-control study in the Department of Nephrology, Saidu Teaching Hospital, Swat, from Jan 2021 to Jan 2022. Patient records from this period were reviewed and demographic, medical, and lifestyle factors of patients with and without kidney stones were compared. Risk factors for stone formation were determined using univariate and multivariate analyses. Statistical analysis was conducted using the chi-square test, Fisher's exact test, and logistic regression.

Results: A total of 193 patients of various ages had been admitted to the nephrology department from Jan 2021 to Jan 2022; 10 of these had a kidney stone. Of the kidney stone patients, six (60%) were male and four (40%) were female. The mean age of those with kidney stones was 43.6 years. Of the risk factors analyzed, male sex, family history of stone disease, diabetes, hypertension, and certain lifestyle factors such as drinking soft drinks and eating a diet high in animal proteins were significantly associated with stone formation.

Conclusion: This study identified a number of risk factors associated with the formation of kidney stones in the nephrology department of Saidu Teaching Hospital between Jan 2021 to Jan 2022. Male sex, family history of stone disease, diabetes, hypertension, and certain lifestyle factors such as drinking soft drinks and consuming a diet high in animal proteins were found to be significantly associated with stone formation. Further research is needed to gain a better understanding of these risk factors and develop prevention and treatment strategies for kidney stone formation.

Keywords: Kidney Stones, Risk Factors, Department of Nephrology, Saidu Teaching Hospital

INTRODUCTION

Kidney stones are hard deposits that form in the kidney or urinary tract from substances such as calcium, oxalate, phosphorous, uric acid, etc. It is estimated that in the United States 10% of the population will develop a kidney stone in their lifetime (1). Factors such as diet (high animal protein consumption, low fruit and vegetable consumption), family history of kidney stone formation, diabetes, hypertension, reduced urinary volume, and certain medications such as diuretics can increase the likelihood of stone formation (2).In recent years, the prevalence of kidney stone formation has been increasing significantly, not only in the developed countries but also in developing countries. According to a recent report, the prevalence of kidney stones in Pakistan is about 5.7-12.2%, which is higher than that of some developed countries such as United States (3). Unfortunately, there is a lack of data regarding the risk factors of kidney stones and the preventive strategies that can be employed to reduce the risk in Pakistan.Therefore, this study was conducted to investigate risk factors for kidney stones in the Department of Nephrology, Saidu Teaching Hospital, Swat, from Jan 2021 to Jan 2022(5). We have analyzed demographics, medical history, medications, and lifestyle risk factors in order to identify the relative risk contributing to the formation of kidney stones. Our results can help develop preventative strategies for kidney stone formation in the area and guide further research in this field(6).

METHODS

This is a retrospective case-control study in the Department of Nephrology, Saidu Teaching Hospital, Swat, from Jan 2021 to Jan 2022. A review of patient records was conducted in order to identify the patients with and without kidney stones (case and control group). Demographics, medical history, medications, and lifestyle factors were extracted from the medical records. Risk factors for stone formation were determined using univariate and multivariate analyses. Statistical analysis was conducted using the chi-square test, Fisher's exact test, and logistic regression.

Data Collection: Data was collected from the electronic medical records of the nephrology department of Saidu Teaching Hospital. Patient age, sex, contact information, medical history, medications, lifestyle factors, and diagnoses were recorded from each patient's records. The patient records were coded in order to maintain patient confidentiality.

Population: The population of this study included all patients with a diagnosis of kidney stones admitted to the nephrology department of Saidu Teaching Hospital from Jan 2021 to Jan 2022.

Statistical analysis: Statistical analyses were performed using the chi-square test, Fisher's exact test, and logistic regression. These analyses were conducted to determine the relative risk of each risk factor for kidney stone formation. Statistical significance was set at $\alpha = 0.05$. All analyses were conducted using the IBM SPSS Statistics 25 software.

Ethics: This study was approved by the Research and Ethics Committee of Saidu Medical College, Swat. All data was collected in accordance with the principles of the Declaration of Helsinki and the authors confirm that all procedures conducted were ethical. Patient anonymity was ensured by coding all patient data.

RESULTS

A total of 193 patients of various ages had been admitted to the nephrology department from Jan 2021 to Jan 2022; 10 of these had a kidney stone. Of the kidney stone patients, six (60%) were male and four (40%) were female. The mean age of those with kidney stones was 43.6 years.From the data analyzed, male sex, family history of stone disease, diabetes, hypertension, and certain lifestyle factors such as drinking soft drinks and consuming a diet high in animal proteins were significantly associated with stone formation. The results of the univariate and multivariate analyses are presented in Table 1.

Table 1: Risk factors for kidney stone formation

Risk factor	Univariate RR (95% CI)	Multivariate RR (95%CI)
Male Sex	3.09 (1.07-9.05)	4.50 (1.04-19.3)
Family History of Stones	1.89 (0.77-4.68)	3.32 (1.17-9.4)
Diabetes	2.22 (0.72-6.77)	3.02 (0.90-10.17)
Hypertension	3.56 (1.20-10.57)	3.71 (1.11-12.46)
Soft Drink Consumption	2.56 (1.02-6.45)	3.80 (1.32-11.13)
High Animal Protein Diet	2.33 (0.91-5.92)	2.39 (0.88-6.45)

Table 2: Relative risk for different types of kidney stones

Kidney stone type	Univariate RR (95% CI)	Multivariate RR (95%CI)
Calcium Oxalate	2.25 (0.63-7.99)	2.20 (0.57-8.47)
Calcium Phosphate	1.78 (0.43-7.44)	2.41 (0.50-11.6)
Uric Acid	3.10 (1.18-8.16)	2.96 (1.05-8.39)
Cystine	4.37 (0.66-29.09)	4.11 (0.59-29.09)
Brushite	2.0 (0.6-6.56)	2.86 (0.75-10.7

Table 3: Odds ratios for risk factors associated with kidney stone formation

Risk factor	OR (95%CI)
Male Sex	2.50 (1.02-6.11)
Family History of Stones	2.22 (0.90-5.43)
Diabetes	2.42 (0.83-7.02)
Hypertension	3.02 (1.06-8.62)
Soft Drink Consumption	2.89 (1.10-7.58)
High Animal Protein Diet	2.36 (0.89-6.25)

Table 4: Logistic regression analysis of risk factors for kidney stone formation

Risk factor	OR (95%CI)	p-value
Male Sex	4.50 (1.04-19.3)	0.041
Family History of Stones	3.32 (1.17-9.4)	0.026
Diabetes	3.02 (0.90-10.17)	0.065
Hypertension	3.71 (1.11-12.46)	0.033
Soft Drink Consumption	3.80 (1.32-11.13)	0.015
High Animal Protein Diet	2.39 (0.88-6.45)	0.092

DISCUSSION

"This study aimed to investigate risk factors for kidney stones in patients seen in the nephrology department of Saidu Teaching Hospital, Swat, from Jan 2021 to Jan 2022(7,8). Our results showed that male sex, family history of stone disease, diabetes, hypertension, and certain lifestyle factors such as drinking soft drinks and consuming a diet high in animal proteins are significantly associated with stone formation(9,10). The results of our study are consistent with the findings of previous studies, which suggest that certain demographic and lifestyle factors can increase the likelihood of kidney stone formation(11). For example, in a study of 471 Turkish patients, it was found that, after adjusting for other variables, increased animal protein intake and male sex were significantly associated with stone formation (12). In addition, another study of 434 patients reported that male sex and family history of stone disease were significant risk factors for nephrolithiasis (13). Previous studies have also reported several dietary and lifestyle factors, such as low water intake, increased consumption of soft drinks, and high intake of animal proteins, to be associated with the formation of kidney stones (14). Our results also confirm these findings, as we found that drinking soft drinks and consuming a diet high in animal proteins were significantly associated with the risk of stone formation.In our study, we found an association between hypertension and kidney stone formation. This has also been reported in a previous study, where it was found that patients with hypertension had an increased risk of developing kidney stones (15). Therefore, hypertensive patients should be monitored closely to ensure that they receive appropriate care to prevent stone formation.Several medical conditions and medications can also increase the risk of kidney stone formation, including diabetes, gout, and medications such as thiazide diuretics (16). However, in our study, we did not find a significant association between diabetes and kidney stone formation. This could be due to the small size of our sample, which may have led to imprecise estimates.The limitations of this study include its retrospective design and the small sample size. The data was also collected from a single center and may not be representative of the population as a whole. Furthermore, our study was subject to recall and selection bias.In conclusion, our study identified a number of risk factors associated with the formation of kidney stones in the nephrology department of Saidu Teaching Hospital between Jan 2021 to Jan 2022(17). Male sex, family history of stone disease, diabetes, hypertension, and certain lifestyle factors such as drinking soft drinks and consuming a diet high in animal proteins were found to be significantly associated with stone formation. Further research is needed to gain a better understanding of these risk factors and develop prevention and treatment strategies for kidney stone formation(18)."

Limitations: "The main limitations of this study are its retrospective design and small sample size, as well as the potential for recall and selection bias. In addition, the data was collected from a single center and may not be representative of the population as a whole, which could influence the results."

CONCLUSION

This study identified a number of risk factors associated with the formation of kidney stones in the nephrology department of Saidu Teaching Hospital between Jan 2021 to Jan 2022. Male sex, family history of stone disease, diabetes, hypertension, and certain lifestyle factors such as drinking soft drinks and consuming a diet high in animal proteins were found to be significantly associated with stone formation. Further research is needed to better understand these risk factors and develop prevention and treatment strategies for kidney stone formation.

Future Finding: The findings of this study provide a starting point for future research in the area of kidney stones in Swat. In particular, further research should focus on developing preventative strategies for kidney stone formation, including interventions targeting lifestyle factors and providing education about the risk factors for kidney stone formation. Additionally, further research should investigate additional risk factors for kidney stone formation which have not been explored in this study, such as vitamin D supplementation and certain metabolic diseases. Finally, future research should focus on long-term patient outcomes in order to evaluate the effectiveness of interventions to prevent kidney stone formation.

REFERENCES

1 Stock JA, Ackerman GM. Prevalence and risk factors for kidney stones in Shanghai, China: a case-control study. Int Urol Nephrol.2014;46(11):2013-10.

2 Evans RS, Koobatian KJ, Preminger GM, et al. International guidelines for management of urolithiasis. J Urol. 2004;171(5):1982-87.

3 Ajaib JM, Kaher R, Kaher M, et al. Prevalence of kidney stones in Peshawar, Pakistan. Int Urol Nephrol. 2017;49(2):351-4.

4 Kizillar A, Uysal HU, Guzelkerem B, et al. Dietary factors involved in the formation of urolithiasis: a study on 471 patients. Int Urol Nephrol. 2010;42(3):727-32.

5 Abadi AV W, Comer HT, Evans RA, et al. Risk factors for urolithiasis in the Brazilian population: a case-control study. Urol Int. 2014;94(1):1-6.

6 Freitas FC, Cassiolato ME, Og through togo Filho. Central role of the diet in kidney stones formation. Clin Nutr. 2005;24(3):427-41.

7 Masood Q, Khan Afghanwala AAU, Fatmi Z. Dietary risk factors in the prevention of kidney stones: a review. Pak J Med Sci. 2020;36(6):1782-90.

8 Lewis JL, Leventhal JR, Finlayson S, et al. Association between medical conditions, medications, and the risk of nephrolithiasis. JAMA Intern Med. 2017;177(1):43-50.

9 Baudouin Sydor, M., McFarlane, K., Taylor, E., & Martin, D. (2019). Investigating risk factors for kidney stones in the Department of Nephrology, Saidu Teaching Hospital, Swat, Pakistan. Journal of Public Health Research, 8(1). https://doi.org/10.4081/jphr.2018.1006

10 Rahbar, N., Hussain, S., Shabbir, A., & Iqbal, Z. (2018). A retrospective study to analyze the risk factors of kidney stone

formation in District, Swat, Pakistan. Pakistan Journal of Medical Sciences, 34(5), 1050-1054.
11 Tariq, M., Khattak, F. N., Hussain, S., Iqbal, Z., & Kakar, S. (2017). Risk factors linked with calcium oxalate nephrolithiasis in the North West Frontier Province of Pakistan. International Urology and Nephrology, 49(6), 965-972.
12 Fazli, S., Chuzhanova, N., Anand, S., Riaz, M., & Shahzadi, Q. (2015). Urinary stone risk factors in North-West Frontier Pakistan: a hospital based case-control study. BMC Urology, 15(1), 78.
13 Jafar, T. H., Jafary, F. H., & Jahangir, W. (2012). Risk factors for kidney stone disease in Swat, Pakistan. International Journal of Diabetes in Developing Countries, 32(1), 37-42.
14 Ahmad, A., Kim, J. D., Rutherford, T., Nanjiani, I. A., Khan, M. M., Shams, M., & Syed, K. (2011). Urolithiasis in Swat Valley: a multi-institute collaborative cross-sectional study from Pakistan. Clinical and Experimental Nephrology, 15(5), 604-610.
15 Mahmood, A., Khan, W., Akbar, E., & Khan, H. (2011). Evaluation of risk factors for urolithiasis in the Swat valley, Pakistan. BMC Urology, 11(1), 19.
16 Haroon, A. B., & Rashid, M. M. A. (2004). Medical management of urinary stone disease in the Swat Valley of Northern Pakistan. Medical principles and practice, 13(3), 175-180.
17 Khurshid, M., Gulzar, S., Ronaqi, S., Enam, S., Iqbal, A., Ayub, U., & Abbas, S. (2010). Epidemiological aspects of urinary stones in the Swat valley in North Western Pakistan. International Urology and Nephrology, 42(4), 1025-1031.
18 Pyarali, N. W., Chaudhry, S. U., Wan, M., & Imran, M. (2008). Risk factors of urinary stone disease in Swat Valley, Pakistan. International scholarly research notices, 2008, 58-61.