

# Assessment of the Risk Factors for Renal Calculi among its Patients at Nephrology OPD in MGMCRI, Puducherry, with a View to Develop Self-instructional Module

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## ABSTRACT

Since centuries, humans have been afflicted with urinary stones dating back to 4,000 BC, and it is the most common disease of the urinary tract. Prevention of recurrence of renal stones remains a serious human health problem.<sup>1,2</sup>

**Background:** Prevention of renal stones recurrence requires a better understanding of the processes involved in stone formation. Kidney stones have been proposed to be a urological condition related to the metabolic syndrome.<sup>3,4</sup> Nephrolithiasis is responsible for 2–3% of end-stage renal diseases.<sup>5</sup>

**Aim:** To identify the risk factors for renal calculi among patients attending nephrology OPD and to find out the association between the risk factors for renal calculi with the selected demographic variables of patients with renal calculi.

**Materials and methods:** Retrospective research design (Quantitative Approach) was adopted for the study. Thirty patients diagnosed with renal calculi were selected by purposive sampling technique. Risk factors were assessed by using open-ended questionnaire, and the data were analyzed by means of descriptive and inferential statistics such as frequency, percentage, mean, standard deviation, and Chi-square test.

**Results:** In the study, 12 (43%) were consuming 3 L of water in a day, 19 (78%) were taking tomatoes more in their food daily, 23 (79%) had no family history of renal calculi, 10 (40%) were having diabetes mellitus, and in consuming excessive amount of salt of more than 59 mg/day, 22 (78%) belong to yes and 8 (22%) belong to no. Regarding consumption of drugs, 19 (64%) belonged to no, 11 (36%) belonged to yes, and 18 (76%) belonged to agriculture. Thirteen (62%) samples are consuming alcohol once weekly, and 18 (64%) were consuming meat twice weekly. With regard to passing urine in a day, most 16 (70%) of the samples were passing 3–5 times, 23 (82%) had history of urinary tract infection, and 26 (86%) were not having the history of immobility. With regard to consumption of milk and milk products, 22 (84%) had daily once. There was association between age and chronic and hereditary disease, gender and chronic and hereditary disease, religion and consumption of salt, and education and chronic and hereditary disease.

**Conclusion:** The risk factors for renal calculi were identified, and the education was given to the patients regarding the preventive measures and to control of risk factors in their day-to-day life. This research has been useful in defining risk factors and looking to the future.

**Keywords:** Assess, Nephrology, Renal calculi, Risk factors, Self-instructional module.

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## INTRODUCTION

The development of human kidney stones affects vast numbers of population worldwide in specific age-groups.<sup>1–4</sup> The deposition of few minerals, crystalline materials in the kidney, and urinary bladder is during the process of metabolism. Stone analysis is of great importance to the therapy and metaphylaxis of residual and recurrent stones.<sup>6–8</sup> Kidney stones are quite common and usually affect people who are between 30 years and 60 years of age.<sup>9,10</sup> Rather than women, it affects men. Renal colic (severe pain caused by a kidney stone) is estimated to affect approximately 10–20% of men and 3–5% of women.<sup>11–13</sup> In India, it is expected that 12% of the population will have urinary stones, of which 50% may end up with kidney loss or renal damage. Recurrent formation of stones is a common problem for all forms of stones and is therefore an important part of medicine.<sup>14–17</sup>

The incidence of urolithiasis varies in different countries. In India, the “stones belt” occupies parts of Maharashtra, Gujarat, Rajasthan, Punjab, Haryana, Delhi, and states of northeast.<sup>18,19</sup> Fewer occurrences of urinary calculi are found in southern India, which may be due to regular dietary intake of tamarind.<sup>19,20</sup> In India, 12% of the people are estimated to have urinary stones of which 50% may end up with loss of kidneys or renal damage. Also, near 15% of

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the people of northern India were affected by urinary stones.<sup>21–25</sup> Singh et al. have reported that the rate of incidence of urolithiasis, particularly staghorn calculi, in Manipur is very high.<sup>22,26,27</sup> Urolithiasis in the recent past indicates that in India that there is an increased prevalence of the urolithiasis in northwestern region.<sup>28</sup>

The development of kidney stones may be caused by dietary habits (diet), age, sex, obesity, genetics and environmental factors,

geographic place, climate, and lifestyle.<sup>29</sup> The prevalence of this disease has increased among males and females of all ages, suggesting not only genetic predisposition but also a potential environmental cause. The incidence of stone disease is also rising globally.<sup>30</sup> The lifetime risk of kidney stones is 6% for women and 12% for men.<sup>31</sup> For those with untreated stones, the risk at 5 years for forming another stone is 30–40%. Since all the epidemiological data show an increase in incidence and prevalence rates, the prevention and techniques for the medical management of urolithiasis requires further attention.<sup>32</sup>

Kavanagh evaluated the prevalence of kidney calculus in patients attending OPD, identified factors affecting the production of kidney stones, and also identified an independent relationship of the following risk factors, in particular family background, sufficient intake of fluid, stress, weight and obesity, eating patterns, and connection with lifestyle changes.<sup>33–35</sup> The analysis was performed among 666 patients with the renal calculi. Of those, 430 (64.56%) were males, and 236 (35.44%) were females. In their male sample, the ratio of female was 1.82:1. All were found to have the most prevalent renal calculus between the ages of 20 and 40.<sup>36–39</sup> The goal of the present investigation is to identify the risk factors for renal calculus among patients attending Nephrology OPD and to determine the correlation between the risk factors for renal calculus with the selected demographic variables of renal calculus patients.

**OBJECTIVES**

- To identify the risk factors for renal calculi.
- To find out the association between the risk factors for renal calculi with the selected demographic variables of patients with renal calculi.

**HYPOTHESIS**

H<sub>1</sub>: Association exists between the renal calculi and selected demographic variables among patients with renal calculi.

**MATERIALS AND METHODS**

Retrospective research design (Quantitative Approach) was adopted for the study. Thirty patients diagnosed with renal calculi were

selected by purposive sampling technique based on the inclusion and exclusion criteria. The researcher obtained formal permission and informed consent from the study participants. The purposes of the study were explained to all the samples. The demographic variables were collected using structured questionnaire, and risk factors were assessed by using open-ended questionnaire. After assessing the risk factors self-instructional module was given to all the samples. The data were analyzed by means of descriptive and inferential statistics such as frequency, percentage, mean, standard deviation, and Chi-square test.

**RESULTS**

In the study, 12 (43%) were consuming 3 L of water in a day, 19 (78%) were taking tomatoes more in their food daily, 23 (79%) had no family history of renal calculi, 10 (40%) were having diabetes mellitus, (Figs 1 to 3) and in consuming excessive amount of salt of more than 59 mg/day, 22 (78%) belong to yes and 8 (22%) belong to no. Regarding consumption of drugs, 19 (64%) belongs to no, 11 (36%) belong to yes, and 18(76%) are belong to agriculture. Thirteen (62%) samples are consuming alcohol once weekly, and 18 (64%) are consuming meat twice weekly. With regard to passing urine in a day, most 16 (70%) of the samples are passing 3–5 times, 23 (82%) had history of urinary tract infection, and 26 (86%) were not having the history of immobility. With regard to consumption of milk and milk products, 22 (84%) had once daily (Table 1). In association, by using Mann–Whitney and Kruskal–Wallis test, it was evidenced that there was an association between age and chronic and hereditary disease; gender and chronic and hereditary disease; religion and consumption of salt; and education and chronic and hereditary disease with a *p* value of <0.001 level. Hence the stated hypothesis (H1) was accepted. Self-instructional module was developed and issued to all the samples for their reference.

**Implications**

The researcher has derived the following implications from the study which are of primary concern in the field of nursing practice, nursing education, nursing administration, and nursing research.

- This can be facilitated by motivating the staff nurses to assess the risk factors for renal calculi, understand the importance

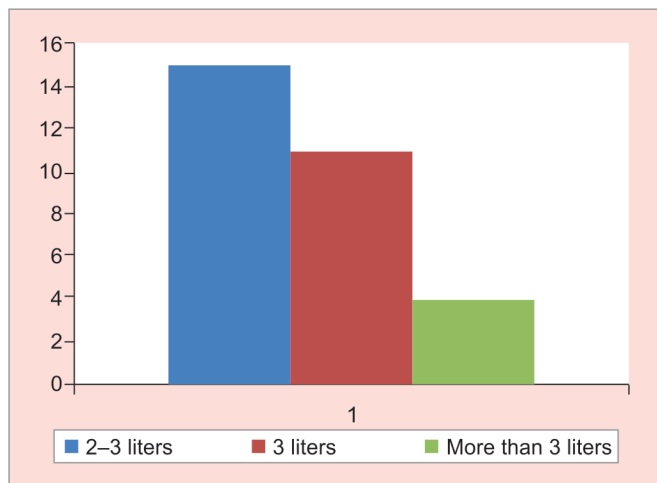


Fig. 1: Percentage distribution of consuming water in a day

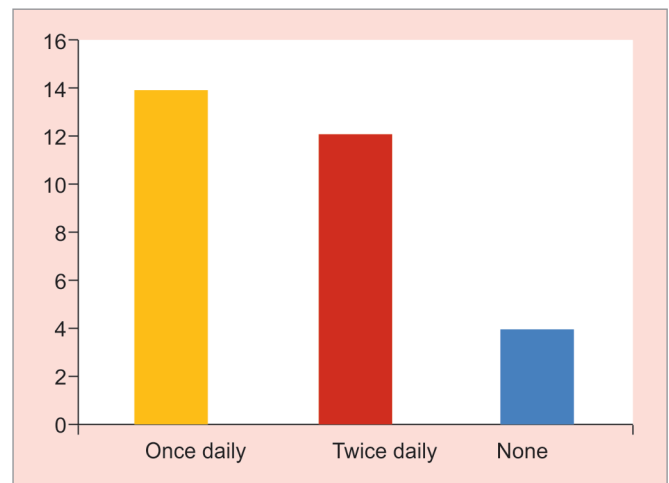


Fig. 2: Percentage distribution of consuming of tomatoes

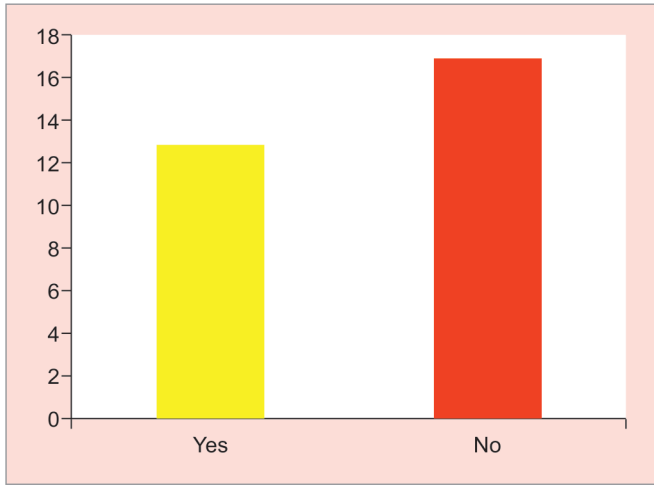


Fig. 3: Percentage distribution of family history of renal calculi

of gaining knowledge regarding risk for renal calculi, and encourage the peer group to involve in assessing risk factors for renal calculi.

- Motivate other professionals about use of research finding to support lectures and teachings.
- Encourage further research studies to assess the risk of renal calculi on the evidence of the review, more research to be conducted, and disseminate the findings through the conferences, seminars, publication in professional, national, and international journals.

**Limitations**

- Difficulty to get consent from the patients had pain
- Patients were not having time to respond after consultation.

**Recommendations**

- The study can be replicated with a large sample for better generalization.
- More studies can be conducted on reducing risk factors for renal calculi and using different complementary and alternative modalities to establish a rightful place for care.
- Studies can be done to assess the knowledge, attitude, and practice of nurse on complementary and alternative therapies.
- Comparison can be done to evaluate the effectiveness of other nursing interventions.

**CONCLUSION**

Calcium stones are predominantly present in the study area. Kidney stone formation may be due to the food habits (diet), age, sex, obesity, genetics and environmental factors, geographical location, climate, and lifestyle. The main conclusion of this study was the risk factors for renal calculi were identified, and education was given to the patients regarding the preventive measures and to control the risk factors in their day-to-day life. This research has been useful in defining risk factors and looking to the future.

**Table 1:** Frequency and percentage distributions of risk factors of renal calculi among patients with renal calculi

S. no.	Risk factors of renal calculi	Frequency (n)	Percentage
1	Consumption of water in a day		
	2-3 L	11	40
	3 L	12	43
	More than liters	7	17
2	Consumption of tomatoes		
	Once daily	19	78
	Thrice weekly	9	14
	None	2	8
3	Family history of renal calculi		
	Yes	7	21
	No	23	79
4	Chronic and hereditary diseases		
	Diabetes mellitus	10	40
	Hypertension	7	36
	Both DM and HTN	8	37
	None	5	8
5	Consumption of excessive amount of salt		
	Yes	22	78
	No	8	22
6	Any past history of renal calculi		
	Yes	23	84
	No	7	16
7	Consuming of any drugs		
	Yes	11	36
	No	19	64
8	Working under sunlight		
	Agriculture	18	76
	Coolie	4	8
	Hot weather	8	16
9	Consumption of alcohol		
	Once weekly	13	62
	Twice weekly	4	8
	Once monthly	4	8
	Rarely	9	20
10	Consumption of meat		
	Once weekly	12	36
	Twice weekly	18	64
	Once Monthly	-	-
	Rarely	-	-
11	Passing urine in a day		
	5-8 times	7	15
	3-5 times	16	70
	Below 3 times	7	15
12	Previous urinary infection		
	Yes	23	82
	No	7	18
13	Long-time bed rest		
	Yes	4	14
	No	26	86
14	Consumption of milk and milk products		
	Twice daily	8	16
	Once daily	22	84

## REFERENCES

- Lewis. Medical surgical nursing. 1st ed., India: Elsevier Publishers; 2011. pp. 1131–1332.
- Wilson EV, Bushiri MJ, Vaidyan VK. Characterization and FTIR spectral studies of human urinary stones from Southern India. *Spectrochim Acta A* 2010;77(2):442–445. DOI: 10.1016/j.saa.2010.06.014.
- Jayaraman UC, Gurusamy A. Review on uro-lithiasis pathophysiology and Aesculapian discussion. *IOSR J Pharm* 2018;8(1):30–42.
- Moe OW, Pearle MS, Sakhaee K. Pharmacotherapy of urolithiasis: evidence from clinical trials. *Kidney Int* 2011;79(4):385–389. DOI: 10.1038/ki.2010.389.
- Srivastava T, Alon US. Pathophysiology of hypercalciuria. *Pediatr Nephrol* 2005;22(10):1659–1673. DOI: 10.1007/s00467-007-0482-6.
- Singh P, Pendse A, Rathore V, Dashora P. Urinary biochemical profile of patients with ureteric calculi in Jodhpur region (north-western India). *Urol Res* 1998;16:101–109.
- Bihl G, Meyers A. Recurrent renal stone disease—advance in pathogenesis and clinical management. *Lancet* 2001;358(9282):651–656. DOI: 10.1016/S0140-6736(01)05782-8.
- Wang W, Jingyuan F, Guifeng H, Jun L, Xi Z, Ye T, et al. Prevalence of kidney stones in mainland China: a systematic review. *Sci Rep* 2017;10:1–9.
- Pearle MS. Prevention of nephrolithiasis. *Curr Opin Nephrol Hypertens* 2001;10(2):203–209. DOI: 10.1097/00041552-200103000-00008.
- Pearle MS, Calhoun EA, Curhan GC. Urologic diseases of America project. Urologic diseases in America project: urolithiasis. *J Urol* 2005;173(3):848–857. DOI: 10.1097/01.ju.0000152082.14384.d7.
- Lavan JN, Neale FC, Posen S. Urinary calculi. Clinical, biochemical and radiological studies in 619 patients. *Med J Aust* 1971;2(21):1049–1061. DOI: 10.5694/j.1326-5377.1971.tb92706.x.
- Coe FL, Evan A, Worcester E. Kidney stone disease. *J Clin Invest* 2005;116(10):2598–2598. DOI: 10.1172/JCI26662.
- Baker PW, Coyle P, Bais R, Rofe AM. Influence of season, age, and sex on renal stone formation in South Australia. *Med J Aust* 1993;159(6):390–392. DOI: 10.5694/j.1326-5377.1993.tb137913.x.
- Curhan GC, Willett WC, Speizer FE. Comparison of dietary calcium with supplemental calcium and other nutrients as factors affecting the risk for kidney stones in women. *Ann Intern Med* 1997;126(7):497–504. DOI: 10.7326/0003-4819-126-7-199704010-00001.
- Curhan GC, Willett WC, Rimm EB. A prospective study of dietary calcium and other nutrients and the risk of symptomatic kidney stones. *N Engl J Med* 1993;328(12):833–838. DOI: 10.1056/NEJM199303253281203.
- Curhan GC, Willett WC, Knight EL. etary factors and the risk of incident kidney stones in younger women:nurses' health study II. *Arch Intern Med* 2004;164(8):885–891. DOI: 10.1001/archinte.164.8.885.
- Brunner, Suddarth's. Textbook of medical surgical nursing. 13th ed., New delhi: Wolterskluwer Publishers; 2014.
- Devuyt O, Pirson Y. Genetic of hypercalciuric stone forming disease. *Kidney Int* 2007;72(9):1065–1072. DOI: 10.1038/sj.ki.5002441.
- Prit D, Friedlander G. Genetic causes of renal lithiasis. *Int Bone Min Soc (IBMS)* 2009. 357–367.
- Abdel Goad EH, Berreczky ZB. Metabolic risk factors in patents with renal stones in KwaZulu natal: an inter-racial study (Asian and whites). *BJU Int* 2004;93(1):120–123. DOI: 10.1111/j.1464-410X.2004.04569.x.
- Chakera A, Paul HJ, O'Callaghan CA. Reversible renal impairment caused by thyroid disease. *Scand J Urol Nephrol* 2010;44(3):190–193. DOI: 10.3109/00365591003636604.
- Costa Bauza A, Isern BP. Factors affecting the regrowth of renal stones in vitro: a contribution to the understanding of renal stone development. *Scand J Urol Nephrol* 2005;39(3):194.
- Sayer JA. Renal disease. *Nephron Physiol* 2010;118(1):35–44. DOI: 10.1159/000320902.
- Chris, Kidney stone causes and risk factors. Home/current health articles. [www.healthcentre.com](http://www.healthcentre.com) 2010.
- Smeltzer SC, Bare BG, Hinkle JL, Cheever KH. Management of patients with urinary disorders. Textbook of medical surgical nursing. 12th ed., Lippincott Williams and Wilkins; 2010; 1375–1380.
- Kavanagh J. Super saturation and renal precipitation. *Urologic Res* 2006;34(2):81–85. DOI: 10.1007/s00240-005-0015-3.
- Lukács T, Frang D, El-Seaghy AA, et al. Multiple urolithiasis in bilharziasis patient. *Int Urol Nephrol* 1989;21(3):269–273. DOI: 10.1007/BF02559736.
- Okada A, Ohshima H, Itoh Y, Yasui K, Tozawa K, Koohri K. Risk of renal stone formation induced by long- term bed rest could be decreased by premeditation with bisphosphonate and increased by resistive exercise. *Int J Urol* 2008;15(7):630–635. DOI: 10.1111/j.1442-2042.2008.02067.x.
- Dalton DL, Hughes J, Glenn JE. Foreign bodies and urinary stones. *Urology* 1999;16:1.
- Agarwal MM, Singh SK, Mavuduru R, Mandal AK. Preventive fluid and dietry therapy for urolithiasis: An appraisal of strength, controversies and lacunae of current literature. *Indian J Urol* 2011;27(3):310–319. DOI: 10.4103/0970-1591.85423.
- Rashid A. A study on an epidemiological profile, mineral metabolic pattern & crystallographic analysis of urolithiasis in Kuwait. *Asian J Urol* 2018. DOI: 10.1016/j.ajur.2018.08.007.
- Kumar S, Dahiya K. A study on socio economic, personal and family profile along with food habits of patient with kidney stone. *J Urol* 2019. DOI: 10.21048/ijnd.2016.53.2.2370.
- Hirvonen T, Pietinen P, Virtanen MJ. A study on nutrient intake and use of beverage and risk of kidney stone among male smokers. *Indian J Urol* 1999;150(2):187–194.
- Bharathi C, Amirthaveni L. Compared 24 hours urinary composition of urinary tone formers and healthy volunteers. *Indian J Nutrit Dietet* 2016;53:74–79. DOI: 10.21048/ijnd.2016.53.2.4303.
- Curhan Z. A study on effect of calcium and other nutrients on risk of symptomatic kidney stone. *Indian J Nutrit* 2012;328(12):880–882.
- Vasanthamani M, Sushmitha G. Studied the impact of diet counseling of kidney stone patient. *Int J Biochem Res* 2016;3(4):429–432.
- Taylor P, Curhan Z. Worked on effect of oxalate intake and risk for nephrolithiasis. *J Am Soc Nephrol* 2007;18(7):2198–2204. DOI: 10.1681/ASN.2007020219.
- <http://www.harvardhealthpublication.com>. 2010. ...kidney stones-risk factors.
- <http://www.About-com>. Health topic A-Z. kidney stone 2010 adam. [about.com/reports/0000081-7.htm](http://about.com/reports/0000081-7.htm).