

# Study on Acute Renal Colic and Comparison of Diclofenac and Ketorolac in Pain Management in University Hospital, Kavre, Nepal

Shrestha SK,<sup>1</sup> Parajuli S,<sup>1</sup> Nyaupane SP,<sup>1</sup> Joshi HN<sup>2</sup>

<sup>1</sup>Department of Emergency and General Practice,

<sup>2</sup>Department of Surgery,

Dhulikhel Hospital, Kathmandu University Hospital

Dhulikhel, Kavre, Nepal.

## Corresponding Author

Sanu Krishna Shrestha

Department of Emergency and General Practice,

Dhulikhel Hospital, Kathmandu University Hospital

Dhulikhel, Kavre, Nepal.

E-mail: drsan7@gmail.com

## Citation

Shrestha SK, Parajuli S, Nyaupane SP, Joshi HN. Study on Acute Renal Colic and Comparison of Diclofenac and Ketorolac in Pain Management in University Hospital, Kavre, Nepal. *Kathmandu Univ Med J.* 2019;65(1):35-9.

## ABSTRACT

### Background

Acute renal colic is the most frequent clinical presentations of renal stone and a common cause of patient visits to emergency departments worldwide. The prevalence of the renal stone disease has increased steadily over the past decades.

### Objective

To describe the prevalence, epidemiological features and clinical management of renal colic patients at emergency department in Kathmandu University Hospital, Kavre, Nepal.

### Method

Two hundred and thirty-six patients with acute renal colic presented in emergency department during a six-months period were included in the study. Using a standard predesigned proforma, demographic characteristics, presenting symptoms, practice of pain management and outcome were investigated. Renal colic attacks in patients were defined according to International Classification of Diseases, Tenth Revision, and Clinical Modification-10.

### Result

Prevalence of renal colic was 2.61%. Mean age of the patients was 33.9±13.7 years. More than half of participants were male (54%). Majority of the patients (47.9%) were from Kavrepalanchowk district. The most common presenting symptom of the patients was flank pain on affected side (79.2%). In almost 43% of patients, diclofenac sodium was administered as a first line analgesic. There was no significant difference between diclofenac and ketorolac with respect to the need of second line analgesic (Chi-square value: 0.19, p value = 0.664).

### Conclusion

Prevalence of renal colic was 2.61% at Dhulikhel hospital. More male patients were affected and the most common presenting symptom was flank pain on the affected. Diclofenac and ketorolac are equally effective for the pain management of renal colic patients.

## KEY WORDS

*Diclofenac, Emergency department, Epidemiology, Renal colic*

## INTRODUCTION

Acute severe colicky pain in the flank region due to the passage of a stone through the urinary system is termed as renal colic (RC), which is commonly diagnosed and treated in the emergency department (ED).<sup>1,2</sup> Although flank pain is the most common symptom in RC or renal stone, abdominal/back pain, and groin pain are other presenting symptoms encountered in these patients.<sup>3</sup> Renal stones can cause intractable pain as stone enter the ureter, triggering a periodic increase of pressure in the collecting system. Usually, such pain does not respond to oral medication, and most patients visit ED for parenteral analgesics.<sup>4</sup>

Renal stones are common in the 'stone belt' region, which extends over America (Southeast), Africa (North), Middle East Asia (Southeast), and Australia (Northeast).<sup>5</sup> It is reported that populations in the western hemisphere (5-9% in Europe, 12% in Canada, 13-15% in the USA) have a higher risk of developing renal stone than the eastern hemisphere (1-5%).<sup>6,7</sup> More men visited than women but women showed significant increases in visits, more likely to be hospitalized and more ill seen in urban setting.<sup>6</sup>

The objective of this study was to describe the prevalence, epidemiological features and clinical management of renal colic patients at ED in Dhulikhel Hospital, Kathmandu University Hospital, Kavre, Nepal. No such study was conducted in this institution yet and recommendations for the management of renal colic was lacking. The baseline information and management of renal colic can be important components of strategies to improve the management of such patients.

## METHODS

After approval of Institutional Review Committee, Kathmandu University School of Medical Sciences, a descriptive observational cross-sectional study was conducted on all patients with acute renal colic presentation at Emergency department (ED) and general practice department at DHKUH. The duration of the study was for 6 months from Jan 1 to June 30, 2018.

A total of 236 patients with renal colic presented at ED during the study period were included in the study. Patients who were 10 years or younger were excluded from the study because the children may not be able to verbalize their pain correctly.

Data was collected prospectively using a standard predesigned proforma. It consisted demographic characteristics, presenting symptoms and practice of pain management to the patients and the outcome of the management. Renal colic attacks in patients visiting the ED were defined according to ICD-10-CM (International Classification of Diseases, Tenth Revision, Clinical Modification).<sup>8</sup> The abstracted data was entered in excel sheet and reviewed for completeness and accuracy. Data

analysis was done using mean, standard deviation and proportion. Prevalence of renal colic at the hospital setting was calculated using the total patients visited at the ED as a denominator. Categorical variables regarding RC, type of analgesic used as the first and second line treatment was compared to each other using chi-squared test. P value below .05 was considered statistically significant.

## RESULTS

A total of 236 patients have received the diagnostic code of renal stones (N20-23) in accord with ICD-10 system and were considered eligible for the study. During the period of data collection a total number of 9,017 patients visited to ED. The prevalence rate of renal stones was 2.61%.

**Table 1. Demographic characteristics of the participants**

Characteristics	Total (n=236)
<b>Age (y/o)</b>	
Mean	33.9±13.7
Range	13-77
<b>Gender</b>	
Male	128 (54%)
Female	108 (46%)
<b>Districts</b>	
Kavrepalanchowk	113 (47.9)
Sindhupalchowk	58 (24.6)
Bhaktapur	23 (9.7%)
Ramechhap	9 (3.8%)
Other districts	33 (14.0%)
<b>Presenting symptoms</b>	
Flank pain	187 (79.2%)
Abdomen pain	30 (12.7%)
Back pain	11 (4.7%)
Other symptoms (groin pain, nausea vomiting)	8 (3.4%)

Pain management was done with administration of analgesics in an injection form. Diclofenac sodium was the most commonly chosen first line nonsteroidal anti-inflammatory drugs (NSAIDs) administered. Seventy-two percentage of the patient didn't require second line of analgesic after initial dose (Table 2).

In relation to pattern of second line analgesics by type of drug at first line (Diclofenac vs. Ketorolac) it was found that there was no significant difference between two groups (Chi-square value: 0.19, p value = 0.664). In patients acquiring diclofenac, 25 patients (24.7%) required second line drug in addition (n=101). In patients acquiring ketorolac, only 16 patients (22%) required additional second line drug (n=73).

Analysis of outcomes of renal colic presentation depicted that most patients i.e. 220 (93%) were discharged after pain management, however 8 patients (3.4%) were admitted to

the hospital mostly due pain or vomiting despite analgesics and antiemetic, and another 3.4% patients were discharged on request.

**Table 2. Analgesics used for the first, second and third line drug for pain management**

Drugs used	First line, n(%)	Second line, n(%)	Third line, n(%)
Diclofenac	101 (42.8)	6 (2.5)	0
Ketorolac	73 (30.9)	24 (10.2)	1 (0.4)
Buscopan	20 (8.5)	3 (1.3)	0
Tramadol	12 (5.1)	17 (7.2)	3 (1.3)
Drotaverin	29 (12.3)	15 (6.4)	0
Aceclofenac	1 (0.4)	0	0
Paracetamol	0	1 (0.4)	0
Morphine	0	0	1 (0.4)
None	0	170 (72)	231 (97.8)

## DISCUSSION

The prevalence rate observed in this study was 2.61%, which is lower than that reported in other studies.<sup>9,10</sup> A study reported that the prevalence of renal colic is higher in the “stone belt”- the equatorial region, including southeast America, northern Africa, the Middle East, southeastern Asia, and northeastern Australia-where the estimated lifetime prevalence is 10-15%.<sup>5</sup> However, lower rates were observed in the study done by Trinchieri i.e. 0.9% and by Frank i.e. 0.2% - 1% in the United States.<sup>11,12</sup>

The mean age of the patients with renal colic was 33.9 years in this study and this finding was almost similar with other studies.<sup>13-15</sup> Some studies found that patients presenting with renal colic were younger.<sup>16,17</sup> More than half of the patients who developed renal colic were male. Several studies reported that renal stones are more common in males than in females.<sup>11,13-15,17-21</sup> In contradictory to this finding, it was observed that there was a dramatic increase from 1997 to 2002 of the adjusted rate of stone disease in females in a representative sample of United States population. The increasing incidence might be due to lifestyle-associated risk factors, such as obesity.<sup>9</sup> Obesity is a major risk factor for developing a kidney stone and one fascinating thing about women versus men is obese women are more likely to develop a stone than an obese man.<sup>6</sup>

Most renal colic patients arrived ED with presenting symptoms of flank pain followed by back pain and abdomen pain in this study. These findings were consistent with previous studies.<sup>3,14,21,22</sup> Intramuscular administration of nonsteroidal anti-inflammatory drugs (NSAIDs) was the most common analgesic in this study which was also commonly used in many other settings.<sup>11,14,23-29</sup> Pathan and colleagues conducted randomized control trial on delivering safe and effective analgesia for management of renal colic in the emergency department: a double-blind, multigroup,

randomised controlled trial in 2015 that also proved that compared to morphine, diclofenac was significantly more effective in achieving the primary outcome (odds ratio [OR] 1.35, 95% CI 1.05-1.73,  $p=0.0187$ ), whereas no difference was detected in the effectiveness of morphine compared with intravenous paracetamol (1.26, 0.99-1.62,  $p=0.0629$ ). On top of that there was a significant lower number of adverse events recorded in the diclofenac group (7 [1%] participants, OR 0.31, 95% CI 0.12-0.78,  $p=0.0088$ ).<sup>30</sup> This indicates that this hospital was using and effective first line analgesic for the pain management of renal colic patients. The important factors in the selection of first-line analgesia in the ED are efficacy, safety, the ease of rapid administration, and the logistics involved.<sup>31</sup> The use of intramuscular drugs are technically faster to administer, has lower fears of unpredictable absorption or renal functions.<sup>32</sup> However, a few studies have suggested that intravenous treatments are more effective than intramuscular administration because of its faster absorption and ease of titration.<sup>33,34</sup> Although intravenous analgesia is frequently preferred, potential arguments against the use of intravenous opioids for excruciating pain are delays to establishing intravenous access and documentation required for dispensing narcotic analgesia. However, intravenous opioid analgesia has been associated with acute respiratory depression and adverse effects on gastrointestinal motility.<sup>35</sup>

This study reported that there were no significant differences in relation to pattern of second line analgesics by type of drug at first line (Diclofenac vs. Ketorolac), the two most commonly used analgesics. Seventy-two percentages of the patients did not require second line drug indicating that these two drugs were effective in managing the pain. This finding was consistent with the study that reported both the drugs are equally effective and safe in renal colicky pain with added advantage of ketorolac being more effective in early period.<sup>36</sup> Another study done in Israel also reported that there is no significance difference between these two drugs, with respect to pain level over time, the number of patients requiring rescue medicine, or the level of adverse effects.<sup>37</sup>

The majority of the patients (more than 90%) in this study were discharged after initial treatment for renal colic and some patients were admitted at the hospital for the further management. These results were consistent with results of previous studies.<sup>11,21</sup> The study done in Korea reported that a total of 92.2% patients of renal colic were managed and discharged from the ED, and only 6.0% patients were admitted; 0.7% of the admitted patients were transferred to other hospitals.<sup>21</sup>

This study is limited in analyzing data from a single center. Clinically relevant information such as chronic illnesses, dietary habits, environmental factors, seasonal variations, and duration of stay in ED, diagnostic investigations of the patients with renal colic were not collected in this study.

## CONCLUSION

Prevalence of renal colic was 2.61% at Dhulikhel hospital. More male patients were affected and the most common presenting symptom was flank pain on the affected site. The findings of this study may facilitate further investigations and important components of strategies to improve the management of renal colic patients. Diclofenac and ketorolac are equally effective for the pain management of renal colic patients.

## REFERENCES

- Perlmutter A, Miller L, Trimble LA. Toradol, an NSAID used for renal colic, decreases renal perfusion and ureteral pressure in a canine model of unilateral ureteral obstruction. *J Urol*. 1993;149:926–930.
- Carter MR, Green BR. Renal Calculi: Emergency Department Diagnosis and Treatment. *Emergency Medicine Practice*. 2011; 13(7). [Internet]. Available from: <http://allanapostol.tripod.com/webonmediaccontents/EMP%20Renal%20Calculi.pdf>.
- Brown J. Diagnostic and treatment patterns for renal colic in US emergency departments. *Int Urol Nephrol*. 2006;38:87–92.
- Huang WY, Chen YF, Carter S, Chang HC, Lan CF, Huang KH. Epidemiology of upper urinary tract stone disease in a Taiwanese population: a nationwide, population-based study. *J Urol*. 2013; 189:2158–63.
- Fisang C, Anding R, Müller SC. Urolithiasis-an interdisciplinary diagnostic, therapeutic and secondary preventive challenge. *Dtsch Arztebl Int*. 2015;112(6): 83–91.
- Ghani KR, Roghmann F, Sammon JD, Trudeau V, Sukumar S, Rahbar H. et al. Upper Urinary Tract Stones Presenting To The Emergency Department In The United States: Trends In Hospitalization And Charges, *The Journal of urology*. 2014 Jan;191(1):90-6. DOI:10.1016/j.juro.2013.07.098.
- Elder JW, Delgado MK, Chung BI, Pirrotta EA, Wang NE. Variation in the intensity of care for patients with uncomplicated renal colic presenting to U.S. emergency departments. *The Journal of emergency medicine*. 2016; 51(6): 628–35.
- Centers for Disease Control and Prevention. International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). Internet. Available from: <https://www.cdc.gov/nchs/icd/icd10cm.htm>.
- Scales CD, Curtis LH, Norris RD, Springhart WP, Sur RL, Schulman KA, Preminger GM. Changing gender prevalence of stone disease. *J Urol*. 2007; 177:979–82.
- Shih MT, Juho YC, Meng E, Sun GH, Cha TL, Wu ST et al. Pain severity in renal colic: a retrospective evaluation of initial visits in patients at a medical center. *International Surgery Journal*. 2016 May;3(2):480–483. [Internet]. Available from: <http://dx.doi.org/10.18203/2349-2902.isj20161010>
- Trinchieri A. Epidemiology of Urolithiasis. *Clinical Cases in Mineral and Bone Metabolism*. 2008;5(2):101-6. [Internet]. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2781200/>
- Frank SH, Resnick MI. Urolithiasis in primary care. *Prim Care*. 1989;16:967–80.
- Kolhe SP, Bhamre SD. Clinical Profile of Patients with Renal Calculi in a Tertiary Care Centre. *MVP Journal of Medical Sciences*. 2017 July-December;4(2):126–134. DOI: 10.18311/mvpjms/2017/v4i2/746
- Serinken M, Karcioglu O, Turkcuier I, Ozkan HI, Keysan MK, Bukiran A. Analysis of clinical and demographic characteristics of patients presenting with renal colic in the emergency department. *BMC Res Notes*. 2008;1:79.
- Pandeya A, Prajapati R, Panta P, Regmi A. Assessment of kidney stone and prevalence of its chemical compositions. *Nepal Med Coll J*. 2010; 12(3): 190-2.
- Pathan SA, Mitra B, Bhutta ZA, Qureshi I, Pencer E, Asmaa A. et al. A Comparative, epidemiological study of acute renal colic presentations to emergency departments in Doha, Qatar, and Melbourne, Australia. *International journal of emergency medicine*. 2018;11(1). DOI 10.1186/s12245-017-0160-9
- Lavan JN, Neale FC, Posen S. Urinary calculi: Clinical biochemical and radiological studies in 619 patients. *Med J Aust*. 1971;2:1049–61.
- Ahmad S, Ansari TM, Shad MA. Prevalence of Renal Calculi; Type, Age And Gender Specific In Southern Punjab, Pakistan. *Professional Med J*. 2016;23(4):389-395. DOI: 10.17957/TPMJ/16.2893.
- Safarinejad MR. Adult urolithiasis in a population-based study in Iran: prevalence, incidence, and associated risk factors. *Urol Res*. 2007;35:73–82.
- Fujita K. Epidemiology of urinary stone colic. *Eur Urol*. 1979; 5:26–28.
- Hong DY, Kim JW, Lee KR, Park SO, Baek KJ. Epidemiologic and Clinical Characteristics of Patients Presenting with Renal Colic in Korea. *Endourology and Stone Disease*. 2015 May-June; 12(3): 2148–53.
- Craig S: Renal Calculi. Emergency Medicine web site. [Internet]. Available from: <http://www.emedicine.com/emerg/topic499.htm>.
- Pathan SA, Mitra B, Romero L, Cameron PA. What is the best analgesic option for patients presenting with renal colic to the emergency department? Protocol for systematic review and meta-analysis. *BMJ open*. 2017;7:e015002.doi: 10.1136/bmjopen-2016-015002.
- Afshar K, Jafari S, Marks AJ, Eftekhari A, MacNeily AE. Nonsteroidal anti-inflammatory drugs (NSAIDs) and non-opioids for acute renal colic. *Cochrane Database of Systematic Reviews*. 2015(6).
- Holdgate A, Pollock T. Nonsteroidal anti-inflammatory drugs (NSAIDs) versus opioids for acute renal colic. *Cochrane Database Syst Rev*. 2015;18(2):Cd004137.
- Kaynar M, Koyuncu F, Buldu I, et al. Comparison of the efficacy of diclofenac, acupuncture, and acetaminophen in the treatment of renal colic. *Am J Emerg Med*. 2015;33:749–5.
- Labrecque M, Dostaler LP, Rousselle R, Nguyen T, Poirier S. Efficacy of nonsteroidal anti-inflammatory drugs in the treatment of acute renal colic. A meta-analysis. *Arch Intern Med*. 1994;154:1381–7.
- Skolarikos A. Medical Treatment of Urinary Stones. *Curr Opin Urol*. 2018. DOI:10.1097/MOU.0000000000000523
- Abergel S, Peyronnet B, Seguin P, Bensalah K, Traxer O, Freund Y. Management of urinary stone disease in general practice: A French Delphi study. *European Journal Of General Practice*. 2016;22(2) 103–10. [Internet]. Available from: <http://dx.doi.org/10.3109/13814788.2016.1149568>
- Pathan SA, Mitra B, Straney L, Afzal MS, Anjum S, Shukla D et al . Delivering safe and effective analgesia for management of renal colic in the emergency department: a double blind, multigroup, randomized controlled trial. *Lancet*. 2016; 387:1999–2007. [Internet]. Available from: [http://dx.doi.org/10.1016/S0140-6736\(16\)00652-8](http://dx.doi.org/10.1016/S0140-6736(16)00652-8).

## ACKNOWLEDGEMENT

We would like to express sincere thanks to all the patients for their valuable participation in this study. We are also thankful to all the staffs of emergency and general practioners department at Dhulikhel Hospital, Kathmandu University Hospital.

31. Pines JM, Hollander JE. Emergency Department Crowding Is Associated With Poor Care for Patients With Severe Pain. *Annals of Emergency Medicine*. 2008 January;51(1). DOI:10.1016/j.annemergmed.2007.07.008.
32. Thomas SH. Management of pain in the emergency department. *ISRN Emerg Med*. 2013. [Internet]. Available from: <http://dx.doi.org/10.1155/2013/583132>
33. Tveita T, Thoner J, Klepstad P, Dale O, Jystad A, Borchgrevink PC. A controlled comparison between single doses of intravenous and intramuscular morphine with respect to analgesic effects and patient safety. *Acta Anaesthesiol Scand*. 2008;52:920–25.
34. Tramer MR, Williams JE, Carroll D, Wiffen PJ, Moore RA, McQuay HJ. Comparing analgesic efficacy of non-steroidal anti-inflammatory drugs given by different routes in acute and chronic pain: a qualitative systematic review. *Acta Anaesthesiol Scand*. 1998;42:71–9.
35. Davies EC, Green CF, Taylor S, Williamson PR, Mottram DR, Pirmohamed M. Adverse drug reactions in hospital in-patients: a prospective analysis of 3695 patient-episodes. *PLoS One*. 2009;4:e4439.
36. Kolasani BP, Juturu J. Intramuscular ketorolac versus diclofenac in acute renal colic: A comparative study of efficacy and safety. *Indian Journal of Basic & Applied Medical Research*. 2013;8(2): 923-31.
37. Cohen E, Hafner R, Rotenberg Z, Fadilla M, Garty M. Comparison of ketorolac and diclofenac in the treatment of renal colic. *Eur J Clin Pharmacol*. 1998;54:455-8.