

## Strategies for preventing end stage kidney disease: The impact of kidney stone disease on Chronic Kidney Disease in Pakistan

Salman Imtiaz, Ashar Alam

### Abstract

Chronic Kidney Disease (CKD) is one of the major non-communicable diseases that have social and economic impacts along with day-to-day health-related problems. Kidney stone disease is still one of the major causes of CKD in Pakistan. Kidney stone disease is a preventable cause of renal failure, if detected and treated early. Kidney stone is prevalent in the stone belt areas in our country which are located in rural areas. The treatment is very costly, and mostly available only in large cities. The treatment requires tertiary care setup and expertise. Therefore, there is a need to focus on the preventive strategies which are mainly dietary and lifestyle modifications, along with public awareness programmes. Nephrologists and urologists along with the government should take interest and give priority to CKD due to stone disease.

**Keywords:** Pakistan, Kidney stones, Chronic kidney disease, Obstructive nephropathy, Stone prevention.

**DOI:** <https://doi.org/10.47391/JPMA.01-114>

### Commentary

Chronic Kidney Disease (CKD) is one of the major non-communicable diseases which have social and economic impacts along with day-to-day health-related problems. Therefore, it has become pivotal to look into the strategies that can reduce the burden of CKD in our society. In the last two decades, there is a change in the aetiological factors of CKD all over the world. Diabetes, hypertension, glomerulonephritis, and tubulointerstitial diseases are recognised as major causes of CKD all over the world. The prevalence of CKD according to geographical and socioeconomic status of the country ranges from 11% to 13%.<sup>1</sup>

In Pakistan, very few studies have been conducted to measure the prevalence of CKD and its causes. Ashar et al showed a prevalence of 16% in a community-based cohort.<sup>2</sup> On the other hand, in a review of CKD epidemiology in Pakistan it was noted that the prevalence range was from 13% to 30% in

.....  
Department of Nephrology, The Indus Hospital, Karachi, Pakistan.

**Correspondence:** Salman Imtiaz. Email: [salman\\_imtiaz@hotmail.com](mailto:salman_imtiaz@hotmail.com)

different studies.<sup>3-6</sup>

In developing countries like Pakistan, along with the above mentioned causes, kidney stone disease, infections and CKD of unknown aetiology are also major contributing factors for CKD, imposing a persistent threat to kidney health.<sup>7</sup> On the contrary, kidney failure is no more a sequel to kidney stone disease in the Western world, nor is the CKD of unknown aetiology.<sup>8</sup> Interestingly, there has been an increase in the incidence of kidney stone diseases in these areas, but it is taken care of in time and does not lead to CKD anymore.<sup>9</sup> In the long run, CKD ultimately ends up in ESRD, requiring renal replacement therapy in the form of haemodialysis, peritoneal dialysis, or renal transplantation. Both the types of dialysis are only supportive and do not offer cure, though, transplantation does come under the umbrella of curative treatment. However, all three procedures are resource intensive, expensive and non-affordable by the poor or lower-middle socioeconomic groups that represent the majority of the countries like Pakistan. Therefore, timely management of kidney stone and prevention of ESRD is vital.

Epidemiologically, Pakistan comes under the 'stone belt', especially the rural and underdeveloped areas that are devoid of any tertiary care urological facility.<sup>10</sup> The cost of major urological procedures such as Extracorporeal Shock Wave Lithotripsy (ESWL), Ureterorenoscopy (URS), Percutaneous Nephrolithotomy (PCNL), etc. is very high and requires appropriate human resource and equipment, and is therefore, limited to urban areas (Table). Due to unaffordability, people living in villages have to resort to extreme measures, to the extent of selling their lands, animals and properties to come to cities to seek treatment. Although some hospitals provide free of cost care but commuting from their villages and accommodation for even a few days or weeks in the cities is expensive.

Regarding different causes of CKD mentioned earlier, a large amount of work and awareness programmes have been carried out for decades. Diabetes, hypertension, glomerular diseases, etc. are being addressed to a large extent universally; however, kidney stone disease as a cause of CKD is highly neglected. In the developing world,

**Table:** Cost of different urological procedures in different hospital of Karachi in Pakistan Rupees.

No	Urological Procedure for stone removal	Minimum cost	Maximum cost
1	Percutaneous Nephrolithotomy (PCNL)	121,000	215,000
2	Ureterscopy (URS)	64,000	170,000
3	Double J (DJ) stenting	34,000	153,000
4	Extra-corporeal shock wave lithotripsy (ESWL)	25,000	36,000
5	Open Pyelolithotomy	85,000	166,000

people are generally unaware of the fact that though kidney stone disease may be completely curable, it can lead to CKD if not treated in time. This lack of awareness of outcomes, coupled with the high cost of treatment of kidney stone disease especially in tertiary care settings, and logistic problems that the poor patients face in visiting cities, prevents them from prioritising treatment of this medical condition. Consequently, they seek treatment only when the problem has advanced, and CKD has established.

The exact mechanism by which kidney stones could reduce kidney function is not fully evident. However, it is attributed to nephron loss due to obstruction, pyelonephritis, crystal plugs at the duct of Bellini, and parenchymal injury from ESWL.<sup>9</sup> ESRD is mostly associated with hereditary causes of kidney stone diseases such as cystinosis, primary hyperoxaluria, and Dent's disease, etc. or struvite stones and recurrent urinary tract infections. Infections are relatively common in rural populations, because of poor personal hygiene, suboptimal toilet conditions, and, most importantly, stones acting as nidus for infection. In a comprehensive review of kidney stone disease in Pakistan, Talati et al concluded that urinary tract infection was caused in 9.6% to 3.9% patients with kidney stone disease. He also found that 22% of patients presenting with obstructed kidneys require relief before definite surgery. In some studies, 0.8% to 1.9% of patients presented with anuria. It was not unusual in a urology unit to receive 10-30 anuric patients in a year. One third of those patients had solitary kidneys and death was an outcome in 7.5% of these patients. A gross disparity is seen between the stone burden in the country and availability of stone treatment facilities or urological units. A nephrologist is likely to see a stone and obstructive uropathy in 36% of patient in a clinic.<sup>11</sup> In the background of this excessive stone burden in our rural areas, we need to develop a screening programme for stone detection at the school and college level as well as at the time of employment at least in the stone belt areas. Along with this, there is also a need to organise screening camps in the community as well as at district hospitals and basic health units to target those asymptomatic

individuals who have a family history of kidney stone disease. The cost of screening is very low, and only requires a dipstick and portable ultrasonography machine. There is also a need to conduct community as well as hospital-based studies to identify different types of stones in different population groups of Pakistan. Talati et al, in their comprehensive review about kidney stone disease in Pakistan, noted a high incidence of oxalate and phosphate stone as in other parts of the world.<sup>12</sup>

Dietary and lifestyle modifications are important strategies worldwide to prevent stone formation and can be applied in our population.<sup>13</sup> Due to poverty and very low caloric and low calcium diet there is also a need to reassess dietary patterns of the people living in these areas and see which food items are widely available in that area which are rich in calcium and citrate as well as in oxalate and phosphates. There is also a need to educate the population through electronic and print media as well as organise awareness programmes in hospitals and in community about the importance of diet available in their area which can precipitate kidney stone disease and those that prevent stone formation. There is also a need to form a "stone prevention task force" which includes a nephrologist, urologist and a dietician at the district hospital level which targets stone eradication as one of their goals. They will develop guidelines according to the local need, educate people, and build capacity in general practitioners, surgeons and physicians to cater to renal stones.

**Disclaimer:** None to declare.

**Conflict of Interest:** None to declare.

**Funding Sources:** None to declare.

## References

- Hill NR, Fatoba ST, Oke JL, Hirst JA, O'Callaghan CA, Lasserson DS, et al. Global Prevalence of Chronic Kidney Disease – A Systematic Review and Meta-Analysis. *PLoS One*. 2016; 11: e0158765.
- Alam A, Amanullah F, Baig-Ansari N, Lotia-Farrukh I, Khan FS. Prevalence and risk factors of kidney disease in urban Karachi: baseline findings from a community cohort study. *BMC Res Notes*. 2014; 7:179.
- Imtiaz S, Salman B, Qureshi R, Drohli MF, Ahmad A. A review of the epidemiology of chronic kidney disease in Pakistan: A global and regional perspective. *Saudi J Kidney Dis Transpl*. 2018; 29:1441-51.
- Rizvi SA, Manzoor K. Causes of chronic renal failure in Pakistan: A single large center experience. *Saudi J Kidney Dis Transpl*. 2002; 13:376-9.
- Rizvi SA, Naqvi SA. Renal replacement therapy in Pakistan. *Saudi J Kidney Dis Transpl*. 1996; 7:404-8.
- Ullah K, Butt G, Masroor I, Kanwal K, Kifayat F. Epidemiology of chronic kidney disease in a Pakistani population. *Saudi J Kidney Dis Transpl*. 2015; 26:1307-10.
- Salman B, Imtiaz S, Qureshi R, Drohli MF, Ahmad A. The Causes of

- Chronic Kidney Disease in Adults in a Developing Country. *J Nephrol Ren Dis.* 2017; 1:1.
8. Stanifer JW, Muiru A, Jafar TH, Patel UD. Chronic kidney disease in low-and middle-income countries. *Nephrol Dial Transplant.* 2016; 31:868-74.
  9. Rule AD, Krambeck AE, Lieske JC. Chronic Kidney Disease in Kidney Stone Formers. *Clin J Am Soc Nephrol.* 2011; 6:2069-75.
  10. Rizvi SA, Naqvi SA, Hussain Z, Hashmi A, Hussain M, Zafar MN, et al. Management of pediatric urolithiasis in Pakistan: experience with 1,440 children. *J Urol.* 2003; 169:634-7.
  11. Manzoor H, Saikali SW. Renal Extracorporeal Lithotripsy. [Online] [Cited 2020 August 21]. Available from: URL: <https://www.ncbi.nlm.nih.gov/books/NBK560887/>
  12. Talati J, Khan F, Drago H, Lall E, Khan NZ, Talati A, et al. Epidemiology of urolithiasis in Pakistan. In: *The Management of Lithiasis.* Dordrecht: Springer,1997; pp-21-33.
  13. Lin BB, Lin ME, Huang RH, Hong YK, Lin BL, He XJ. Dietary and lifestyle factors for primary prevention of nephrolithiasis: a systematic review and meta-analysis. *BMC Nephrol.* 2020; 21:267.
-