

EFFECT OF HOT IMMERSION BATH ON CHRONIC KIDNEY DISEASE - A CASE STUDY

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Abstract

Chronic kidney disease is a progressive disorder characterized by a gradual decline in renal function, and complementary therapies have increasingly been explored as adjuncts to conventional management. The present case study was conducted to evaluate the effect of a hot immersion bath on renal function in a patient with stage 2 chronic kidney disease. A 42-year-old male with complaints of right flank pain, burning micturition, and increased urinary frequency received a hot immersion bath for 20 minutes daily for seven consecutive days in addition to prescribed conventional medications. Renal function was assessed before and after the intervention using the estimated glomerular filtration rate. The baseline estimated glomerular filtration rate was 75 mL/min/1.73 m² and increased to 83 mL/min/1.73 m² following completion of the intervention, indicating an improvement in renal filtration function. No adverse events were reported during the treatment period. The findings suggested that a hot immersion bath may have a beneficial effect on renal function when used as an adjunct to conventional treatment in patients with early-stage chronic kidney disease. However, as this observation was derived from a single case with a short intervention period, further well-designed clinical studies involving larger sample sizes and longer follow-up are required to establish the efficacy, safety, and long-term therapeutic benefits of this intervention.

Key Words: Chronic kidney disease, Estimated glomerular filtration rate, Hydrotherapy, Renal function, Water immersion

1. INTRODUCTION

Chronic kidney disease (CKD) is a long-standing pathological condition characterized by persistent abnormalities in renal structure or function that result in a gradual decline in kidney performance.(1),(2) The diagnosis is established when markers of kidney damage are present or when the estimated glomerular filtration rate (eGFR) remains below 60 mL/min/1.73 m² for a period of at least three months, irrespective of the underlying aetiology.(3),(4),(5)

The worldwide prevalence of CKD is estimated at 13.4%, establishing it as a major public health concern. Among the different stages of CKD, stage G3 is the most frequently observed.(6),(7) Evidence from community-based studies indicates that the prevalence of CKD in India is approximately 13–14%, underscoring the increasing disease burden.(8) The KDIGO classification system categorizes CKD using glomerular filtration rate stages (G1–G5) together with albuminuria grades (A1–A3), thereby supporting assessment of disease severity, prognostic evaluation, and therapeutic planning.(9) Diabetes mellitus (DM) and hypertension (HTN) are the major risk factors contributing almost 40–60% of CKD cases in India.(10)

Conventional treatment of CKD primarily directed toward slowing the progression of renal dysfunction, optimizing the management of associated comorbidities, preserving residual kidney function, and reducing the risk of disease-related complications.(11),(12),(13) Pharmacological therapy requires dose optimization based on the degree of renal impairment to ensure therapeutic efficacy and minimize drug-related toxicity, along with that reversible contributors causing renal dysfunction should be identified and treated.(14),(15)

Complementary and alternative medicine (CAM) comprises diverse healthcare systems and therapeutic approaches that are used either alongside or in place of conventional medicine for disease prevention and management (16). The increasing prevalence of lifestyle-related disorders has contributed to greater utilization of CAM worldwide. CAM encompasses traditional medical systems such as Traditional Chinese Medicine, Ayurveda, Siddha, Homeopathy, and Naturopathy. (17),(18) Among these, naturopathy is a holistic system of medicine that is based on the theory of Panchamahabhutas, a form of primary healthcare that integrates natural therapeutic modalities to promote health, prevent disease, and facilitate the body's intrinsic self-regulatory and healing mechanisms. (19), (20)

Certain research papers, such as naturopathy, yoga, and dietary modification, have emerged as potential adjunctive interventions for optimizing renal function and enhancing overall well-being in individuals with renal disorders. Especially hydrotherapy, where 2 hours of immersion for 7 days led to increased urine output, a mild sodium excretion rise, a 7 kg weight loss, and a drop in serum creatinine from 520 to 370 µmol/L was observed in a severe hepatorenal syndrome (HRS) patient. A quasi-experimental study indicates that warm water foot bath therapy reduces fatigue among haemodialysis patients. (21)

Another research paper suggests that hot foot baths help reduce fatigue scores in CKD patients, lower creatinine levels, and improve urine output. However, scientific research on the use of hot immersion baths is limited. Therefore, this case report aimed to describe the clinical and renal function changes observed following a hot immersion bath intervention in a patient with chronic kidney disease. (22)

2.CASE HISTORY

A male person aged 42 years visited Chhatrapati Shivaji Subharti Hospital on 03/07/2026 with complaints of Dull aching pain in the right flank for 3 months, occasional burning micturition for 2 months, and increased frequency of urination for 1 month. The pain was non-radiating with moderate intensity, aggravated by intense work, and relieved partially by analgesics, Paracetamol 650 mg orally (sos). Recently, the patient had undergone lab investigation. Ultrasonography of the abdomen revealed a renal calculus and Kidney function tests reported a serum creatinine of 1.30 mg/dL with an eGFR of 60 mL/min/1.73 m². There was no previous history of hospitalization, and no relevant family history was reported. Currently, the patient is on medication for renal stones. Tamsulosin 0.4 mg orally

taken once daily at bedtime, Potassium Citrate 10 mEq orally three times daily after meals, Paracetamol 650 mg orally when pain aggravates, and Drotaverine 80 mg orally for renal colic. During the per-abdomen examination, in correlation with the reports, there was mild tenderness in the right renal angle.

For further management of stage 2 CKD, the patient was advised to undergo Naturopathy and Yoga treatment on an OPD basis at Maharishi Aurobindo Subharti Hospital of Naturopathy & Yogic Sciences. Written informed consent of the patient was obtained.

Intervention

A hot immersion bath: The tub was filled with approximately 230 liters of hot water, and the temperature will be accurately monitored using a hydraulic (water) thermometer. Participants was instructed to remove all clothing and enter the tub, lying in a relaxed position with the head elevated and kept outside the water. A cold compress, prepared by immersing a cloth in cold water, was applied to the forehead to support thermal regulation. The intervention lasted for 20 minutes, during which the water temperature was consistently maintained between 100°F and 104°F. Upon completion of the session, participants was promptly dried to prevent heat loss and ensure comfort (Figure 1).(23)

Temperature: 100°F -104°F.(23)

Duration: 20 mins daily for 7 days along with prescribed medications. (24)



Figure 1: Hot immersion bath given for a patient

Procedure: After completion of 7 days of a hot immersion bath, the patient was advised to undergo a renal function test.

Outcome measurements

Kidney function test (eGFR levels)

eGFR, a biochemical test used to evaluate the function of the kidney and to assess the stages of CKD. According to KDIGO guidelines, an eGFR Level of 90–120 mL/min/1.73 m² is considered as normal. The stages of CKD are described in the table provided below. (25) The eGFR levels were assessed before and after the treatment period (Table 1).

Table 1: The stages of CKD according to KDIGO guidelines

GFR Category	eGFR (mL/min/1.73 m ²)	CKD Stage	Description
G1	≥90	Stage 1	Normal or high kidney function (requires evidence of kidney damage)
G2	60–89	Stage 2	Mildly decreased kidney function (requires evidence of kidney damage)

G3a	45–59	Stage 3a	Mild to moderately decreased kidney function
G3b	30–44	Stage 3b	Moderately to severely decrease kidney function
G4	15–29	Stage 4	Severely decreased kidney function
G5	<15	Stage 5	Kidney failure (End-stage kidney disease if dialysis/transplant is required)

Ethical Considerations

The study protocol was reviewed and approved by the University Ethics Committee (Medical), Swami Vivekanand Subharti University, Meerut, Uttar Pradesh, India. The protocol was reviewed during the Ethics Committee meetings held on 25 and 26 July 2025, and formal approval was issued on 13 November 2025 (Ref. No. SMC/UECM/2025/1203/396). The Ethics Committee is registered with the National Ethics Committee Registry for Biomedical and Health Research, Department of Health Research, Ministry of Health & Family Welfare, Government of India (Registration No. EC/NEW/INST/2023/UP/0358).

3.RESULT

The study demonstrated a significant improvement in renal function following the intervention. The mean estimated glomerular filtration rate (eGFR) increased from 75 mL/min/1.73 m² at baseline, indicating mildly reduced kidney function, to 83 mL/min/1.73 m² after 7 days of a hot immersion bath therapy, suggesting improved renal filtration function.

4.DISCUSSION

The present study demonstrated that a 7-day intervention consisting of daily 20-minute hot immersion bath sessions was associated with a transient enhancement in renal filtration, as reflected by the observed increase in estimated glomerular filtration rate (eGFR). These findings are consistent with previous investigations reporting favorable renal physiological responses following aquatic immersion. Schou et al. suggested that reduced generation of angiotensin II during water immersion contributes to enhanced natriuresis by modulating the renin–angiotensin system.(26) Similarly, Valenti et al. reported that immersion induces a reversible elevation in urinary aquaporin-2 excretion, indicating temporary alterations in renal water transport mechanisms.(27) Furthermore, Pechter et al. described that aquatic immersion elicits multiple hemodynamic and neurohormonal adaptations, including suppression of plasma renin activity, attenuation of renal sympathetic nerve activity, and changes in circulating catecholamines and prostaglandins.(28,29) Collectively, these physiological responses may improve renal perfusion, facilitate sodium excretion, and transiently enhance glomerular filtration, thereby supporting the beneficial effects of aquatic therapies on renal function (Figure 2).

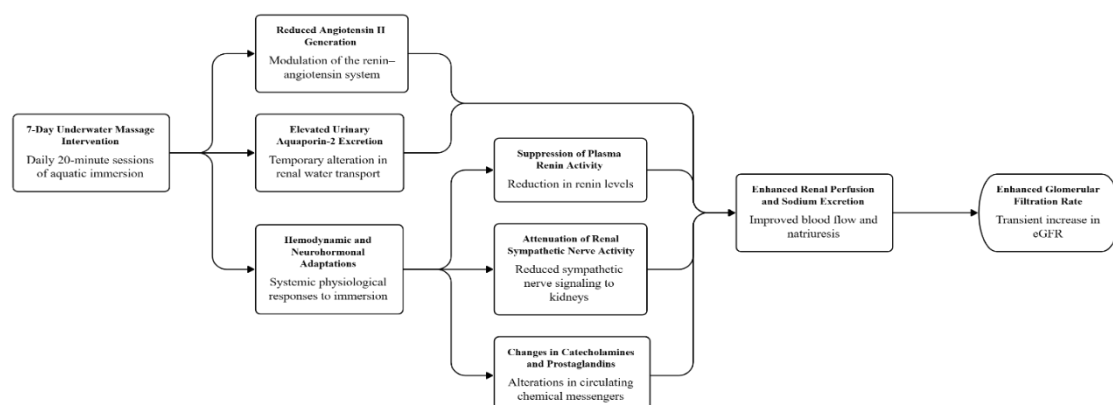


Figure 2: Potential mechanism of immersion bath on renal function in CKD

Strengths, Limitations and Future opportunities

The principal limitation of this case report is the inclusion of a single patient, which restricts the generalizability of the findings. The short intervention duration and absence of long-term follow-up also limit conclusions regarding the sustainability of the observed change in renal function. In addition, the patient continued prescribed pharmacological treatment during the intervention period; therefore, the independent contribution of the hot immersion bath cannot be established.

5.CONCLUSION

Based on the case report, the findings suggest that a hot immersion bath treatment, performed daily for 20 minutes over a period of seven days in conjunction with regular medical care, was associated with a favourable short-term change in kidney function., demonstrated by the increase in the estimated glomerular filtration rate (eGFR). These effects could have been caused by the positive effects of hydrotherapy on hemodynamic and neurohormonal activity, which may have temporarily improved the perfusion and filtration rates in the kidneys. The results of this case study cannot confirm the causality of the observed effects due to the design of the experiment. However, the data can serve as initial proof of the feasibility and potential usefulness of a hot immersion bath therapy in managing the early stages of chronic kidney disease.

References

1. Chen TK, Knicely DH, Grams ME. Chronic Kidney Disease Diagnosis and Management: A Review. *JAMA*. 2019 Oct 1;322(13):1294-1304. doi: 10.1001/jama.2019.14745. PMID: 31573641; PMCID: PMC7015670.
2. Maringhini, S., & Zoccali, C. (2024). Chronic Kidney Disease Progression—A Challenge. *Biomedicines*, 12(10), 2203. <https://doi.org/10.3390/biomedicines12102203>
3. Behning, C., Schultheiss, U. T., Nadal, J., Meiselbach, H., Schönherr, S., Forer, L., Schaeffner, E., Krane, V., Schneider, M. P., Schmid, M., Kronenberg, F., Köttgen, A., Eckardt, K. U., Kotsis, F., & GCKD study investigators (2025). Heterogeneity of Estimated GFR Slopes According to Etiology, Estimated GFR and Urinary Albumin-to-Creatinine Ratio in a Large Cohort of Patients With CKD. *Kidney international reports*, 11(2), 103696. <https://doi.org/10.1016/j.ekir.2025.11.021>
4. Horie R, Endo Y, Doi K. Estimated glomerular filtration rate may be an independent predictor for clinical outcomes regardless of acute kidney injury complication in the emergency department. *PLoS One*. 2021 Oct 14;16(10):e0258665. doi: 10.1371/journal.pone.0258665. PMID: 34648576; PMCID: PMC8516290.
5. Cavalier, E., Zima, T., Datta, P., Makris, K., Schaeffner, E., Langlois, M., Plebani, M., Delanaye, P., & EFLM Task Group on Chronic Kidney Disease (2024). Recommendations for European laboratories based on the KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. *Clinical chemistry and laboratory medicine*, 63(3), 525–534. <https://doi.org/10.1515/cclm-2024-1082>
6. Jadoul, M., Aoun, M., & Masimango Imani, M. (2024). The major global burden of chronic kidney disease. *The Lancet. Global health*, 12(3), e342–e343. [https://doi.org/10.1016/S2214-109X\(24\)00050-0](https://doi.org/10.1016/S2214-109X(24)00050-0)
7. Guo, J., Liu, Z., Wang, P., Wu, H., Fan, K., Jin, J., Zheng, L., Liu, Z., Xie, R., & Li, C. (2025). Global, regional, and national burden inequality of chronic kidney disease, 1990-2021: a systematic analysis for the global burden of disease study 2021. *Frontiers in medicine*, 11, 1501175. <https://doi.org/10.3389/fmed.2024.1501175>
8. Talukdar, R., Ajayan, R., Gupta, S., Biswas, S., Parveen, M., Sadhukhan, D., Sinha, A. P., & Parameswaran, S. (2025). Chronic Kidney Disease Prevalence in India: A Systematic Review and Meta-Analysis From Community-Based

- Representative Evidence Between 2011 to 2023. *Nephrology* (Carlton, Vic.), 30(1), e14420. <https://doi.org/10.1111/nep.14420>
9. Inker, L. A., Astor, B. C., Fox, C. H., Isakova, T., Lash, J. P., Peralta, C. A., Kurella Tamura, M., & Feldman, H. I. (2014). KDOQI US commentary on the 2012 KDIGO clinical practice guideline for the evaluation and management of CKD. *American journal of kidney diseases : the official journal of the National Kidney Foundation*, 63(5), 713–735. <https://doi.org/10.1053/j.ajkd.2014.01.416>
10. Webster, A. C., Nagler, E. V., Morton, R. L., & Masson, P. (2017). Chronic Kidney Disease. *Lancet* (London, England), 389(10075), 1238–1252. [https://doi.org/10.1016/S0140-6736\(16\)32064-5](https://doi.org/10.1016/S0140-6736(16)32064-5)
11. Wühl E, Schaefer F. Therapeutic strategies to slow chronic kidney disease progression. *Pediatr Nephrol*. 2008 May;23(5):705-16. doi: 10.1007/s00467-008-0789-y. Epub 2008 Mar 12. PMID: 18335252; PMCID: PMC2275772.
12. Drawz PE, Rosenberg ME. Slowing progression of chronic kidney disease. *Kidney Int Suppl* (2011). 2013 Dec;3(4):372-376. doi: 10.1038/kisup.2013.80. PMID: 25019022; PMCID: PMC4089661.
13. Ortiz A, Arreola Guerra JM, Chan JCN, Jha V, Kramer H, Nicholas SB, Pavkov ME, Wanner C, Wong LP, Cheung M, King JM, Grams ME, Jadoul M, Tuttle KR; Conference Participants. Preventing chronic kidney disease and maintaining kidney health: conclusions from a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference. *Kidney Int*. 2025 Oct;108(4):555-571. doi: 10.1016/j.kint.2025.04.005. Epub 2025 Jun 19. PMID: 40536455; PMCID: PMC12646115.
14. Swan SK, Bennett WM. Drug dosing guidelines in patients with renal failure. *West J Med*. 1992 Jun;156(6):633-8. PMID: 1615656; PMCID: PMC1003352.
15. Prajapati A, Ganguly B. Appropriateness of drug dose and frequency in patients with renal dysfunction in a tertiary care hospital: A cross-sectional study. *J Pharm Bioallied Sci*. 2013 Apr;5(2):136-40. doi: 10.4103/0975-7406.111829. PMID: 23833519; PMCID: PMC3697192.
16. Lee, G. B., Charn, T. C., Chew, Z. H., & Ng, T. P. (2004). Complementary and alternative medicine use in patients with chronic diseases in primary care is associated with perceived quality of care and cultural beliefs. *Family practice*, 21(6), 654–660. <https://doi.org/10.1093/fampra/cmh613>
17. Chen W, Fitzgerald JM, Rousseau R, Lynd LD, Tan WC, Sadatsafavi M. Complementary and alternative asthma treatments and their association with asthma control: a population-based study. *BMJ Open*. 2013 Sep 4;3(9):e003360. doi: 10.1136/bmjopen-2013-003360. PMID: 24005131; PMCID: PMC3773646.
18. Mortada E. M. (2024). Evidence-Based Complementary and Alternative Medicine in Current Medical Practice. *Cureus*, 16(1), e52041. <https://doi.org/10.7759/cureus.52041>
19. Nair PMK, Silwal K, Keswani J, Kriplani S, Khan V, Maheshwari A, Shah MA, Jyoti N, Rao V, Sreedhar C, Bhalavat KD, Mohanan R, Subha M J, Gupta R, Sharma H, Tewani GR. Management of polyneuropathy using yoga and naturopathic medicine in India: recommendations for future research and clinical practice. *Front Pain Res (Lausanne)*. 2023 Oct 25;4:1264450. doi: 10.3389/fpain.2023.1264450. PMID: 37954066; PMCID: PMC10634222.
20. Fleming SA, Gutknecht NC. Naturopathy and the primary care practice. *Prim Care*. 2010 Mar;37(1):119-36. doi: 10.1016/j.pop.2009.09.002. PMID: 20189002; PMCID: PMC2883816.
21. Yersin, B., Burnier, M., & Magnenat, P. (1995). Improvement of renal failure with repeated head-out water immersions in patients with hepatorenal syndrome associated with alcoholic hepatitis. *American journal of nephrology*, 15(3), 260–265. <https://doi.org/10.1159/000168843>
22. Güler, S., Şahan, S., Ülker, T., & Sipahioğlu, M. H. (2024). The effect of

- footbath applied to patients receiving hemodialysis treatment on comfort, fatigue, and dialysis symptoms: A randomized controlled study. *Therapeutic apheresis and dialysis : official peer-reviewed journal of the International Society for Apheresis, the Japanese Society for Apheresis, the Japanese Society for Dialysis Therapy*, 28(1), 23–33. <https://doi.org/10.1111/1744-9987.14043>
23. KELLOGG JH. Rational Hydrotherapy: a Manual of the Physiological and Therapeutic Effects of Hydratic Procedures and the Technique of Their Application in the Treatment of Disease. Vol. 124, *The American Journal of the Medical Sciences*. 1902ed. p. 529.
24. Yersin, B., Burnier, M., & Magnenat, P. (1995). Improvement of renal failure with repeated head-out water immersions in patients with hepatorenal syndrome associated with alcoholic hepatitis. *American journal of nephrology*, 15(3), 260–265. <https://doi.org/10.1159/000168843>
25. Inker, L. A., Astor, B. C., Fox, C. H., Isakova, T., Lash, J. P., Peralta, C. A., Kurella Tamura, M., & Feldman, H. I. (2014). KDOQI US commentary on the 2012 KDIGO clinical practice guideline for the evaluation and management of CKD. *American journal of kidney diseases : the official journal of the National Kidney Foundation*, 63(5), 713–735. <https://doi.org/10.1053/j.ajkd.2014.01.416>
26. Schou M, Gabrielsen A, Bruun NE, Skøtt P, Pump B, Dige-Petersen H, Frandsen E, Bie P, Warberg J, Christensen NJ, Norsk P: Angiotensin II attenuates the natriuresis of water immersion in humans. *Am J Physiol Regul Integr Comp Physiol*, 2002, 283: R187-96.
27. Valenti G, Fraszl W, Addabbo F, Tamma G, Procino G, Satta E, Cirillo M, De Santo NG, Drummer C, Bellini L, Kowoll R, Schlemmer M, Vogler S, Kirsch KA, Svelto M, Gunga HC: Water immersion is associated with an increase in aquaporin-2 excretion in healthy volunteers. *Biochim Biophys Acta*, 2006, 1758:1111-6.
28. Pechter, U., Ots, M., Mesikepp, S., Zilmer, K., Kullisaar, T., Vihalemm, T., Zilmer, M., & Maaroos, J. (2003). Beneficial effects of water-based exercise in patients with chronic kidney disease. *International journal of rehabilitation research. Internationale Zeitschrift fur Rehabilitations forschung. Revue internationale de recherches de readaptation*, 26(2), 153–156. <https://doi.org/10.1097/00004356-200306000-00013>
29. B, M., Barakoti, A., Prasad, A., Arora, R., Narayanan, R., & Das Adhikary, A. (2026). Hydrotherapy for overweight and obesity: A systematic review of anthropometric and lipid outcomes. *Cureus*, 18(8), e115048. <https://doi.org/10.7759/cureus.115048>