

The Skin: A Critical Window into Chronic Kidney Disease and a Call for Collaborative Care

Nomakhosi Mpofana¹, Shamanie Govender²

¹Department of Somatology, Durban University of Technology, Durban, KwaZulu-Natal, South Africa; ²Department of Biomedical and Clinical Technology, Durban University of Technology, Durban, KwaZulu-Natal, South Africa

Correspondence: Nomakhosi Mpofana; Shamanie Govender, Email nomakhosim@dut.ac.za; shamanieg@dut.ac.za

Purpose/Objective: Chronic kidney disease (CKD), a complex and progressive condition, affects multiple organ systems, including the skin, where manifestations are common yet often underrecognized. This commentary aims to highlight these dermatologic signs as not only indicators of disease severity but also as opportunities for earlier intervention, improved patient comfort, and multi-disciplinary collaboration. By examining the clinical relevance, educational importance, and research potential of CKD, we aim to promote a more comprehensive and proactive approach to its management.

Materials/Methods – Literature Review: This expert commentary emphasizes the clinical significance of skin manifestations in chronic kidney disease and advocates for a comprehensive, multidisciplinary approach grounded in research, education, and patient-centered care.

Findings/Results: Management of CKD should be integrated into standard nephrology care, with particular focus on symptoms such as pruritus, xerosis, and calciphylaxis, which not only cause discomfort but may also signal treatment deficiencies. Interdisciplinary collaboration among dermatologists, somatologists, and nephrologists is crucial to ensure timely diagnosis and comprehensive care. Additionally, educating patients about the potential skin-related complications of renal disease and encouraging them to report symptoms early can improve treatment adherence and lead to better outcomes.

Conclusion and Recommendations: Cutaneous signs in CKD patients need more clinical focus, as they often signal early systemic problems and greatly affect quality of life. A comprehensive, patient-focused approach based on research, education, and policy change will be key to improving outcomes and enhancing the well-being of those with kidney disease.

Keywords: chronic kidney diseases, renal pruritis, dermatology, somatology, nephrology, multidisciplinary

Background

As the body's largest organ, the skin forms a crucial interface between our internal physiology and the external world.¹ It is uniquely susceptible to systemic illnesses, acting as a canvas upon which the story of internal disease is often written. Nowhere is this more evident than in the context of kidney disorders. The kidneys are key regulators of homeostasis, and when this function is inhibited, the resulting metabolic, biochemical, and physiological disarray reverberates throughout the body, leaving distinct imprints on the skin. These dermatological symptoms are often early bench markers of underlying kidney disease, making their prompt identification and interpretation essential for diagnosis and comprehensive treatment.²

The Spectrum of Cutaneous Manifestations in Renal Disease

CKD and end-stage renal disease (ESRD) unleash a broad spectrum of skin abnormalities that considerably degrade patients' quality of life.³ These warning signs demand clinical attention. Common yet profoundly impactful symptoms include pruritus and xerosis, pigmentary changes, uremic stigmata, calciphylaxis, and nephrogenic systemic fibrosis.

Pruritus and Xerosis

Uremic pruritus, or intractable itching, is one of the most frequent and tormenting manifestations for individuals with CKD, affecting a significant percentage of dialysis patients. While its pathophysiology is multifaceted, implicating systemic inflammation, uremic toxin accumulation, and dysregulated opioid receptors, its impact is clear. Persistent scratching damages the skin barrier, heightens the risk of secondary infections, and severely diminishes quality of life.⁴

Closely accompanying pruritus is xerosis, or profound dry skin, resulting from the atrophy of sweat and sebaceous glands in CKD. This condition exacerbates itching and compromises the skin's natural protective barrier, making patients vulnerable to irritation and infection. Management of these common conditions is a cornerstone of patient comfort, relying on adequate hydration, specialized emollients, and meticulous skin care routines.⁵

Pigmentary Changes and Uremic Stigmata

Kidney dysfunction often redraws the skin's appearance. The accumulation of urochrome pigments can impart a sallow, yellowish tone, while disruptions in melanin regulation may lead to hyperpigmentation, creating a characteristic "muddy" complexion. Conversely, the profound anaemia resulting from reduced erythropoietin production frequently results in pallor. In cases of extreme uremia, a rare but dramatic sign known as uremic frost may appear, where crystallized urea deposits become visible on the skin's surface as sweat evaporates.⁶

Calciphylaxis and Nephrogenic Systemic Fibrosis

Calciphylaxis is a life-threatening condition, primarily seen in dialysis patients, characterized by the calcification and thrombosis of blood vessels in the skin. This leads to excruciatingly painful, necrotic cutaneous ulcers with an inferior prognosis. Its management requires an urgent, multidisciplinary effort to correct severe metabolic imbalances.⁷

Nephrogenic systemic fibrosis (NSF) is another debilitating disorder, historically linked to gadolinium-based contrast agents in patients with compromised kidney function.⁸ It causes progressive and irreversible hardening and thickening of the skin, often leading to joint contractures and systemic involvement. The recognition of this risk has led to strict restrictions on gadolinium use in this vulnerable population.⁸ Systemic diseases affecting the kidneys also exhibit unique skin manifestations, further emphasizing the intricate connection between kidney dysfunction and dermatological symptoms.

Dermatological Challenges Arising from Renal Therapies

Treatments for kidney failure, while life-sustaining, create their dermatological challenges, highlighting the importance of comprehensive patient care.

The Cutaneous Impact of Dialysis

Both hemodialysis and peritoneal dialysis can trigger various skin reactions. The dialysis procedure itself often exacerbates pruritus and xerosis. Patients are also susceptible to specific complications, including infections at vascular access or peritoneal catheter exit sites. Such infections require vigilant hygiene and prompt treatment to prevent more severe sequelae, such as cellulitis or peritonitis.⁹

Skin Health Following Kidney Transplantation

While a successful transplant restores renal function, the necessary lifelong immunosuppression creates a new landscape of dermatological risk. Patients are rendered vulnerable to medication-induced rashes, photosensitivity, and acneiform eruptions. Most critically, the suppression of immune surveillance leads to a dramatically increased risk of cutaneous malignancies, particularly non-melanoma skin cancers like squamous cell carcinoma. This elevated cancer risk mandates a paradigm of proactive, preventative care.

Collaborative Integration of All Facets of Skin Care

Addressing the intricate dermatological complications associated with kidney disease is not the sole role of a single medical specialty; instead, it requires a truly comprehensive and multidisciplinary approach. The cornerstone of this

methodology is a dynamic collaboration among nephrologists, dermatologists, and somatologists to attain optimal patient outcomes.^{10–12}

Somatologists possess specialized qualifications aimed at enhancing the quality of life through the treatment of uncomfortable symptoms such as severe xerosis, pruritus, and inflammation. Their expertise extends beyond mere cosmetic care as they adopt a therapeutic approach. Employing various non-invasive methodologies, somatologists can offer significant relief from these uncomfortable skin conditions resulting from kidney disorders.¹⁰ Hydrotherapy, which has a calming effect, helps restore hydration to compromised skin.^{10,13} Additionally, advanced treatments, including Light-Emitting Diode (LED) therapy, can offer substantial anti-inflammatory and wound-healing benefits for skin damaged by chronic scratching.¹⁰

Moreover, a comprehensive strategy should integrate the use of phytotherapy. Botanicals renowned for their healing properties, such as oat extracts for soothing irritation, calendula for its anti-inflammatory effects, and aloe vera for deep hydration, play a crucial role.^{14,15} These natural agents aid in developing gentle, yet effective emollients, which are essential for restoring the skin barrier in these patients.¹⁵ This holistic approach, which combines medical management with therapeutic skincare and evidence-based natural solutions, exemplifies the future of patient-centred care.^{11,12}

Conclusion

Cutaneous manifestations in patients with kidney disorders are more than just cosmetic concerns. They serve as vital indicators of underlying systemic illness, reflecting both the severity of kidney damage and the response to treatment. These skin conditions, including itching, dryness, as well as serious problems like ulcers and skin cancers, significantly impact patient's quality of life, health, and survival. Managing them requires a comprehensive approach that addresses renal issues and involves specialized dermatological and skincare support. The key to improving patient outcomes is breaking down clinical barriers and fostering strong, collaborative teamwork among nephrologists, dermatologists, and somatologists. Through collaboration, this multidisciplinary team can provide comprehensive support and ensure the patient's overall health and well-being.

Perspectives and Recommendations

Cutaneous manifestations in patients with CKD require increased clinical attention, as they are often early signs of systemic dysfunction and greatly affect patient quality of life. Their management should be incorporated into standard nephrology care, with a special focus on symptoms such as pruritus, xerosis, and calciphylaxis, which not only cause discomfort but may also indicate treatment shortcomings. Collaboration between dermatologists and nephrologists is essential to ensure prompt diagnosis and comprehensive care. Additionally, educating patients about potential skin-related complications of renal disease and encouraging them to report symptoms early can enhance treatment adherence and lead to better outcomes.

To enhance patient care, further research is essential to elucidate the pathophysiological connections between renal impairment and dermatological conditions. This entails examining inflammatory pathways, the accumulation of uremic toxins, and dysfunction of the skin barrier. Evidence-based, standardized guidelines for the diagnosis and management of renal-related skin disorders should be developed through clinical trials and translational research. Educational programs for healthcare professionals ought to incorporate dermatological aspects of renal disease to enhance clinical proficiency. Concurrently, healthcare systems should adopt multidisciplinary care models that recognize the importance of skin health in the management of chronic kidney disease. A comprehensive, patient-centered strategy grounded in research, education, and policy reform will be instrumental in advancing clinical outcomes and enhancing the quality of life for individuals affected by kidney disease.

Abbreviations

CKD, chronic kidney disease; ERSD, end-stage renal disease; light emitting diode.

Data Sharing Statement

All material and data supporting the conclusion of this commentary are included in the article.

Funding

This research is supported in part by funding from the New Generation of Academic Programme (nGAP) at the Durban University of Technology, in collaboration with the Department of Higher Education and Training (DHET), from 2020-2027.

Disclosure

The authors declare no conflict of interest.

References

1. Soler Palacios B, Gutiérrez-González A. *Neuron– Macrophage Interaction in the Healing Process of the Skin*. Wiley Online Library; 2022.
2. DeFronzo RA, Norton L, Abdul-Ghani M. Renal, metabolic and cardiovascular considerations of SGLT2 inhibition. *Nat Rev Nephrol*. 2017;13(1):11–26. doi:10.1038/nrneph.2016.170
3. Chou C-L, Chiu H-W, Hsu Y-H, Yu SM-W, Liou T-H, Sung L-C. Impact of chronic kidney disease and end-stage renal disease on the mid-term adverse outcomes in diabetic patients with cardiovascular diseases. *Sci Rep*. 2024;14(1):15770. doi:10.1038/s41598-024-66655-0
4. Ren C, Kang D, Zhang M. The association between pruritic dermatoses and inflammatory factors on sleep disorders: a cross-sectional study of the National Health and Nutrition Examination Survey (NHANES). *Biotechnol Genet Eng Rev*. 2024;40(3):2910–2925. doi:10.1080/02648725.2023.2202988
5. Amin R, Lechner A, Vogt A, Blume-Peytavi U, Kottner J. Molecular characterization of xerosis cutis: a systematic review. *PLoS One*. 2021;16(12):e0261253. doi:10.1371/journal.pone.0261253
6. Hamza E, Metzinger L, Metzinger-Le Meuth V. Uremic toxins affect erythropoiesis during the course of chronic kidney disease: a review. *Cells*. 2020;9(9):2039. doi:10.3390/cells9092039
7. Qin L, Zhang J, Xiao Y, et al. Pre-clinical research of human amnion-derived mesenchymal stem cells and its first clinical treatment for a severe uremic calciphylaxis patient. *medRxiv*. 2021;2021.09.23.21261751.
8. Gallo-Bernal S, Patino-Jaramillo N, Calixto CA, et al. Nephrogenic systemic fibrosis in patients with chronic kidney disease after the use of gadolinium-based contrast agents: a review for the cardiovascular imager. *Diagnostics*. 2022;12(8):1816. doi:10.3390/diagnostics12081816
9. Krajewski PK, Olczyk P, Krajewska M, Krajewski W, Szepietowski JC. Clinical characteristics of itch in renal transplant recipients. *Front Med*. 2021;7:615334. doi:10.3389/fmed.2020.615334
10. Mpfana N, Maitland Griffiths CE, Dlova NC, Cordelia Dlova N. The feasibility of an interdisciplinary approach on the management of psoriasis in South Africa. *Altern Ther Health Med*. 2022;28(2):58–64.
11. Maskey A, Kumar A, Shrestha R. Study of cutaneous manifestations in end stage kidney disease undergoing hemodialysis. *Nepal J Dermatol Venereol Leprol*. 2020;18(1):37–43. doi:10.3126/njdv1.v18i1.29568
12. Al-Thnaibat MH, Urabi HM, Alkofahi HS, et al. The skin manifestations in end-stage renal disease patients in Jordan, single-center experience. *BMC Nephrol*. 2025;26(1):6. doi:10.1186/s12882-024-03922-2
13. Sihonqo B, Kuupiel D, Nxumalo CT, Mokgadi MU, Mpfana N. Exploring the impact of hydrotherapy interventions on stress reduction in construction workers: a scoping review protocol. *F1000Research*. 2024;13:869. doi:10.12688/f1000research.153848.1
14. Nomakhosi M, Heidi A. Natural options for management of melasma. *J Cosmet Laser Ther*. 2018;20(7–8):470–481. doi:10.1080/14764172.2018.1427874
15. Makgobole MU, Mpfana N, Ajao AAN. Medicinal plants for dermatological diseases: ethnopharmacological significance of botanicals from West Africa in skin care. *Cosmetics*. 2023;10(6):167. doi:10.3390/cosmetics10060167

Journal of Multidisciplinary Healthcare

Publish your work in this journal

The Journal of Multidisciplinary Healthcare is an international, peer-reviewed open-access journal that aims to represent and publish research in healthcare areas delivered by practitioners of different disciplines. This includes studies and reviews conducted by multidisciplinary teams as well as research which evaluates the results or conduct of such teams or healthcare processes in general. The journal covers a very wide range of areas and welcomes submissions from practitioners at all levels, from all over the world. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/journal-of-multidisciplinary-healthcare-journal>

Dovepress
Taylor & Francis Group