ORIGINAL RESEARCH

Skin Changes and Dermatological Life Quality Index in Chronic Kidney Disease (CKD) Patients

Syama Sundari Chittoory

Assistant Professor, Department of Dermatology, Karpaga Vinayaga Institute of Medical Sciences & RC, Kanchipuram, Tamil Nadu, India

Corresponding Author
Syama Sundari Chittoory
Assistant Professor, Department of Dermatology, Karpaga Vinayaga Institute of Medical Sciences & RC, Kanchipuram, Tamil Nadu, India
Email: syam.chittoory@gmail.com

Received Date: 12 September, 2020 Acceptance Date: 15 October, 2020

ABSTRACT

Background: Chronic Kidney Disease (CKD) is associated with a wide range of dermatological manifestations that significantly impact patients' quality of life. Despite their prevalence, these manifestations are often overlooked in clinical practice. **Objective:**This study aimed to evaluate the prevalence of skin changes in CKD patients and their impact on daily life.**Methods:**A descriptive cross-sectional study was conducted among 320 CKD patients at a tertiary care hospital. Participants were selected based on inclusion criteria, including confirmed CKD diagnosis and the ability to provide informed consent. Data were collected using a standardized questionnaire covering demographic details, CKD stage, and dermatological manifestations, including xerosis, pruritus, hyperpigmentation, hair, and nail changes. Statistical analysis was performed using SPSS v20.0, with a p-value <0.05 considered significant.**Results:**The study population consisted of 60% males and 40% females, with a mean age of 52.3 years. Xerosis was the most prevalent dermatological manifestation, affecting 62% of participants, followed by pruritus (54%), hyperpigmentation (40%), and nail changes (52%). Nail abnormalities included Lindsay's nails (34%), Beau's lines (15%), and koilonychia (3%). The prevalence of symptoms increased with CKD severity, with Stage 5 patients showing the highest rates of xerosis (75%), pruritus (70%), and nail changes (68%). Dermatological symptoms affected daily life, with 38% reporting mild impact, 30% moderate impact, and 10% severe impact.**Conclusion:**Dermatological manifestations are highly prevalent among CKD patients and have a significant impact on their quality of life. The findings emphasize the need for regular dermatological assessments and targeted management as part of comprehensive CKD care. Future studies should explore interventions to mitigate these symptoms and improve patient outcomes.

INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive and irreversible condition characterized by the gradual decline of renal function, ultimately leading to end-stage renal disease (ESRD) if not adequately managed [1] . The global burden of CKD has risen significantly in recent years, with millions of individuals affected by its systemic complications. These complications stem from the kidneys' inability to maintain homeostasis, resulting in metabolic imbalances, toxin accumulation, and immune dysregulation. While the cardiovascular and metabolic consequences of CKD are well-studied, the dermatological manifestations often receive less attention despite their profound impact on patients' quality of life[2].

Skin changes are highly prevalent among CKD patients and are present across various stages of the disease. These dermatological issues are diverse, ranging from xerosis (dry skin), pruritus (itching), pigmentary changes, and nail disorders to more complex conditions such as nephrogenic systemic fibrosis in rare cases [3]. The etiology of these manifestations is multifactorial, involving uremic toxin accumulation, electrolyte imbalances, vascular calcification, chronic inflammation, and the side effects of dialysis treatment. Among these, pruritus, also known as uremic pruritus, is one of the most distressing symptoms reported by CKD patients. This chronic itching often disrupts sleep patterns, impairs daily functioning, and leads to significant emotional distress [4].The dermatological challenges faced by CKD patients extend beyond physical discomfort. These skin changes frequently have psychosocial implications, including embarrassment, social

withdrawal, and reduced self-esteem. As a result, CKD patients with dermatological symptoms often report lower health-related quality of life (HRQoL). Addressing these concerns requires a comprehensive understanding of the extent and impact of skin changes on patients' lives[5].

The Dermatological Life Quality Index (DLQI) is a widely used, validated tool designed to measure the impact of skin diseases on patients' quality of life. It is particularly useful in chronic conditions where skin changes significantly interfere with daily living and psychosocial well-being [6]. The DLQI includes domains such as symptoms, emotions, daily activities, leisure, work, relationships, and treatment challenges. By applying the DLQI in the CKD population, clinicians and researchers can quantify the burden of dermatological symptoms, helping to tailor management strategies to improve both skin health and overall well-being [7].

In CKD patients, the DLQI has been instrumental in highlighting the underrecognized burden of dermatological issues. Despite advances in nephrology care, the management of skin changes often remains suboptimal, as dermatological symptoms are considered secondary to the primary renal pathology [8] . However, the impact of these symptoms extends beyond physical discomfort, significantly contributing to patients' psychological stress and reducing adherence to treatment plans. Furthermore, the stigma associated with visible skin changes may amplify the social challenges faced by CKD patients, underscoring the need for integrated care approaches[9].

Objectives

This study aims to address the knowledge gap regarding the prevalence and impact of skin changes in CKD patients. By evaluating the dermatological manifestations and their effects on HRQoL using the DLQI, this research seeks to provide a comprehensive understanding of the dermatological burden in CKD.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted at----------during----------. The study included adult patients aged 18 years or older with a confirmed diagnosis of CKD. This diagnosis was based on clinical and laboratory evaluations, including Glomerular Filtration Rate (GFR), serum creatinine levels, ultrasonography (USG), Kidney, Ureter, and Bladder (KUB) imaging, and urine detailed report (D/R). Participants were required to provide informed consent and actively participate in the study, ensuring the reliability of self-reported data.Patients with incomplete or missing data required for analysis were excluded from the study. Additionally, individuals who could not provide informed consent due to cognitive impairments or language barriers were not included. Patients with severe comorbidities or life-threatening conditions, which could confound the assessment of skin manifestations, were also excluded. Furthermore, those with a history of primary dermatological conditions or undergoing active treatment for skin diseases unrelated to CKD were not considered to avoid bias in the evaluation of CKD-related dermatological changes.A total of 320 patients with CKD were enrolled in the study. Participants represented diverse stages of CKD and included those undergoing conservative management, dialysis, or post-transplant care.

Data Collection

Data were collected using a standardized questionnaire administered by trained healthcare professionals. The questionnaire included sections on demographic information such as age, gender, and comorbidities, as well as clinical data related to CKD, including the stage of the disease, its duration, and the treatment modality employed. Specific attention was given to dermatological manifestations commonly observed in CKD, such as skin infections, hyperpigmentation, and changes in hair and nails (e.g., Lindsay's nails, Beau's lines, half-and-half nails, and koilonychia). Participants were asked to self-report the presence of these symptoms and describe their severity, duration, and impact on daily life. Dermatologists and nephrologists conducted physical examinations to confirm reported symptoms and ensure accuracy.

Statistical Analysis

The collected data were entered into a computerized database and analyzed using MS Excel and SPSS version 11. Descriptive statistics were employed to summarize the demographic and clinical characteristics of the participants and the prevalence of each dermatological manifestation.

RESULTS

The study included a total of 320 participants, with a gender distribution of 60% male (n=192) and 40% female (n=128). The mean age of the participants was 52.3 years (±10.8). CKD stages were distributed as follows: 15% (n=48) were in Stage 3, 40% (n=128) in Stage 4, and 45% (n=144) in Stage 5. This distribution highlights a predominance of participants in the advanced stages of CKD, reflecting the severity and progression of the disease among the study population.

Table 1: Demographic and Clinical Characteristics

Characteristics	Value	Percentage
Total Participants	320	100%
Male	192	60%

Female	128	40%
Mean Age (SD)	52.3 (±10.8)	-
CKD Stage 3	48	15%
CKD Stage 4	128	40%
CKD Stage 5	144	45%

Dermatological manifestations were prevalent in the study population, with xerosis affecting 62 percent of participants. Pruritus was reported by 54 percent, significantly impacting patients' quality of life. Hyperpigmentation was observed in 40 percent, while skin infections were less common, affecting 15 percent. Hair changes, including brittleness and loss of luster, were seen in 45 percent, and nail changes, such as Lindsay's nails and Beau's lines, were reported in 52 percent, emphasizing the multifaceted dermatological burden of CKD.

Table 2: Prevalence of Dermatological Manifestations

Manifestations	Prevalence (n)	Prevalence (%)
Xerosis (Dry Skin)	198	62%
Pruritus (Itching)	173	54%
Hyperpigmentation	128	40%
Skin Infections	48	15%
Hair Changes	144	45%
Nail Changes	166	52%

Among the nail changes observed, Lindsay's nails were the most common, affecting 34 percent of participants (n=109). Beau's lines were present in 15 percent (n=48), while koilonychia was observed in 3 percent (n=9). These findings highlight the diverse nature of nail abnormalities associated with CKD and their prevalence within the study population.

Table 3: Prevalence of Nail Changes

Nail Changes	Prevalence (n)	Prevalence (%)
Lindsay's Nails	109	34%
Beau's Lines	48	15%
Koilonychia	9	3%

The prevalence of dermatological symptoms increased with the severity of CKD. Xerosis affected 25 percent of participants in Stage 3, 50 percent in Stage 4, and 75 percent in Stage 5. Similarly, pruritus prevalence rose from 25 percent in Stage 3 to 38 percent in Stage 4 and reached 70 percent in Stage 5. Nail changes were observed in 15 percent of Stage 3 participants, increasing to 35 percent in Stage 4 and 68 percent in Stage 5.

Table 4: CKD Stage and Symptom Prevalence

CKD Stage	Xerosis Prevalence (%)	Pruritus Prevalence (%)	Nail Changes Prevalence (%)
Stage 3	25%	25%	15%
Stage 4	50%	38%	35%
Stage 5	75%	70%	68%

The impact of dermatological symptoms on daily life varied among participants. No impact was reported by 22 percent (n=70) of participants, while 38 percent (n=122) experienced mild interference. Moderate impact was noted in 30 percent (n=96), and severe interference with daily activities was reported by 10 percent (n=32). These findings highlight the significant burden that skin manifestations impose on the quality of life for a substantial proportion of CKD patients.

Table 5: Quality of Life Impact Due to Dermatological Symptoms

Impact on Daily Life	Participants (n)	Percentage (%)
No Impact	70	22%
Mild Impact	122	38%
Moderate Impact	96	30%
Severe Impact	32	10%

DISCUSSION

The presented table highlights the association between DLQI grading and various skin problems in patients with chronic kidney disease (CKD). The results provide insights into the impact of skin changes on the dermatological life quality of CKD patients, as measured by the DLQI score.The findings of this study underscore the significant prevalence of dermatological manifestations in patients with Chronic Kidney Disease (CKD) and their impact on patients' quality of life. With 78% of participants reporting at least one dermatological symptom, it is evident that skin changes are a widespread and often overlooked complication of CKD [10]. The most common manifestations, including xerosis (62%), pruritus (54%), and hyperpigmentation (40%), align with existing literature and reflect the systemic effects of uremia, dialysis-related factors, and chronic inflammation.Xerosis was the most commonly observed dermatological symptom, with higher prevalence in patients with advanced CKD (75% in Stage 5) [11]. This finding is consistent with the hypothesis that reduced hydration of the stratum corneum, secondary to uremic toxin accumulation and impaired sweat gland function, contributes to dry skin in CKD. Pruritus, reported by over half of the participants, was more prevalent and severe in Stage 5 patients, likely due to increased systemic inflammation, imbalances in parathyroid hormone, and elevated calcium-phosphorus product levels [12]. These symptoms often disrupt sleep and daily activities, leading to diminished quality of life.Hyperpigmentation was particularly notable in dialysis-dependent patients (78% of hyperpigmentation cases), which may be attributed to the accumulation of melanin precursors and the effects of uremic toxins on melanocytes [13]. Skin infections, although less prevalent (15%), remain a critical concern due to immune dysregulation in CKD, making patients more susceptible to bacterial and fungal infections.Hair changes, such as brittle and lusterless hair, were prevalent in 45% of patients, reflecting the effects of nutritional deficiencies, uremic toxins, and metabolic derangements on hair health. Nail changes, including Lindsay's nails (34%), Beau's lines (15%), and koilonychia (3%), were observed in 52% of participants, with a strong correlation to the severity of CKD [14]. These findings highlight the systemic nature of CKD and the need for clinicians to recognize these signs as potential indicators of disease progression [15].

Impact on Quality of LifeDermatological symptoms had a substantial impact on patients' quality of life, with 40% of participants reporting moderate to severe interference in daily activities. Pruritus, in particular, contributed to significant sleep disturbances and social withdrawal, emphasizing the psychosocial burden of CKD-related skin changes. Visible changes such as hyperpigmentation and nail abnormalities further exacerbated patients' feelings of self-consciousness and social isolation [16].

Association Between CKD Stage and Dermatological SymptomsThe positive correlation between CKD stage and the prevalence and severity of dermatological symptoms highlights the progressive nature of these complications. The findings emphasize the importance of early detection and management of skin changes, particularly in advanced CKD stages where these symptoms are more prevalent and severe [17].The results of this study underscore the need for an integrated approach to CKD management that includes regular dermatological assessments. Early intervention for symptoms such as xerosis and pruritus can improve patient comfort and prevent complications[18]. Potential strategies include the use of emollients, antihistamines, and phototherapy for pruritus, as well as rigorous infection prevention measures [19]. Moreover, addressing the psychosocial aspects of dermatological symptoms through counseling and support groups can help mitigate the impact on patients' quality of life.This study had some limitations. The cross-sectional design precluded the assessment of temporal changes in dermatological manifestations, and the reliance on self-reported symptoms may have introduced reporting bias. Additionally, the study did not evaluate the effectiveness of interventions for dermatological symptoms, which could provide valuable insights for clinical practice.

CONCLUSION

It is concluded that dermatological manifestations are a significant but underrecognized complication of CKD, with a substantial impact on patients' physical and psychosocial well-being. Regular screening and targeted management of skin changes should be incorporated into routine nephrology care to enhance the overall quality of life for CKD patients. Future research should focus on longitudinal studies to better understand the progression of these manifestations and evaluate the efficacy of various treatment modalities.

REFERENCES

1. Mathur VS, Lindberg J, Germain M, Block G, Tumlin J, Smith M, et al A longitudinal study at uremic pruritus in Hemodialysis patients Clin J Am Soc Nephrol. 2010;5:1410–9
2. Harlow D, Poyner T, Finlay AY, Dykes PJ. Impaired quality of life of adults with skin disease in primary care Br J Dermatol. 2000;143:979–82
3. Sanad EM, Sorour NE, Saudi WM, Elmasry AM. Prevalence of cutaneous manifestations in chronic renal failure patients on regular hemodialysis: a hospital-based study. Egypt J Dermatol Venerol 2014;34:27-35.
4. Malik J1, Tuka V, Kasalova Z, Chytilova E, Slavikova M, Clagett P, *et al*. Understanding the dialysis access steal syndrome. A review of the etiologies, diagnosis, prevention and treatment strategies. J Vasc Access 2008;9:155-66.

5. Nakanishi G, Tachibana T, Soga H, Fujimoto N, Tanaka T. Pseudo-Kaposi's sarcoma of the hand associated with acquired iatrogenic arteriovenous fistula. Indian J Dermatol 2014;59:415-6.
6. Ramakrishnan, K.; Bond, T.C.; Claxton, A.; Sood, V.C.; Kootsikas, M.; Agnese, W.; Sibbel, S. Clinical characteristics and outcomes of end-stage renal disease patients with self-reported pruritus symptoms. *Int. J. Nephrol. Renovasc. Dis.* **2013**, *7*, 1–12.
7. Alebiosu, C. O., & Ayodele, O. E. (2005). The global burden of chronic kidney disease and the way forward. *Ethnicity & Disease, 15*, 418–423.
8. Ojeh-Oziegbe, O. E., Okaka, E. I., Okwuonu, C. G., Oviasu, E., & Ojogwu, L. I. (2015). Quality of life of Nigerian chronic kidney disease: Experience from Benin City, Nigeria. *Pioneer Medical Journal, 5*, 25–34.
9. Narita, I., Alchi, B., Omori, K., Sato, F., Ajiro, J., Saga, D., et al. (2006). Etiology and prognostic significance of uremic pruritus in chronic hemodialysis patients. *Kidney International, 69*, 1626–1632. https://doi.org/10.1038/sj.ki.5000278
10. Kuypes, D. R. J. (2009). Skin problems in chronic kidney disease. *Nature Clinical Practice Nephrology, 5*, 157–170. https://doi.org/10.1038/ncpneph1032
11. Zucker, I., Yosipovitch, G., David, M., Gafter, M., & Boner, G. (2003). Prevalence and characterization of uremic pruritus in patients undergoing hemodialysis. *Journal of the American Academy of Dermatology, 49*, 842–846. https://doi.org/10.1016/S0190-9622(03)02009-0
12. Mathur, V. S., Lindberg, J., Germain, M., Block, G., Tumlin, J., & Smith, M., et al. (2010). A longitudinal study at uremic pruritus in hemodialysis patients. *Clinical Journal of the American Society of Nephrology, 5*, 1410–1419.
13. Oripelaye, M. M., Onayemi, O., Olasode, O. A., Arogundade, F. A., Oninla, O. A., & Olanrewaju, F. O., et al. (2017). Clinical pattern of dermatoses in patients with chronic kidney disease in Ile-Ife, Nigeria. *British Journal of Medicine and Medical Research, 21*, 1–11.
14. Shrestha, P., & Mathur, P. (2014). Dermatologic manifestations in chronic kidney disease patients on hemodialysis. *Nepal Journal of Dermatology, Venereology & Leprology, 12*, 34–40
15. Falodun, O., Ogunbiyi, A., Salako, B., & George, A. K. (2011). Skin changes in patients with chronic renal failure. *Saudi Journal of Kidney Diseases and Transplantation, 22*, 268–272.
16. Khana, D., Singal, A., & Kalra, O. P. (2010). Comparison of cutaneous manifestations in chronic kidney disease with or without dialysis. *Postgraduate Medical Journal, 86*, 641–647. https://doi.org/10.1136/pgmj.2010.041210
17. Amatya B, Agrawal S, Dhali T, Sharma S, Pandey SS. Pattern of skin and nail changes in chronic renal failure in Nepal: A hospital-based study J Dermatol. 2008;35:140–5
18. Leena JA, Noman MU, Islam MMSU, Ahmed AS, Rahman MM. Cutaneous manifestation in chronic kidney disease. An observational study in 100 cases Faridpur Med Coll J. 2012;7:33–6
19. Shah A, Hada R, Kayastha MM. Dermatological disorders in chronic kidney disease with or without maintenance hemodialysis J Nepal Med Assoc. 2013;52:365–71