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DERMATOLOGICAL MANIFESTATIONS IN CHRONIC KIDNEY DISEASE PATIENTS.

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Abstract

Background: Chronic Kidney Disease (CKD) is associated with a wide spectrum of dermatological manifestations due to metabolic, endocrine, and immunological disturbances. These cutaneous changes significantly affect patients' quality of life.

Objective: To evaluate the prevalence and pattern of dermatological manifestations in patients with CKD and to correlate them with underlying etiologies. ***Methodology:*** A cross-sectional observational study was conducted among 100 CKD patients. Demographic data, etiology of CKD, and dermatological manifestations were recorded. Clinical examination was performed to identify skin, hair, nail, and mucosal changes. ***Results:*** Among 100 patients, females (56%) slightly outnumbered males (44%). Diabetes (36%) was the leading cause of CKD, followed by chronic interstitial nephritis (26%) and hypertension (18%). Xerosis (76%) was the most common dermatological manifestation, followed by pallor (66%), pruritus (48%), hyperpigmentation (42%), nail changes (38%), and hair changes (32%). Infections were noted in 32% of patients, while oral mucosal changes (12%) and Kyrle's disease (1%) were less frequent. ***Conclusion:*** Dermatological manifestations are highly prevalent in CKD patients, with xerosis and pallor being the most common. Early recognition and management can improve patient comfort and quality of life.

Keywords: Chronic Kidney Disease, Xerosis, Pruritus, Dermatological Manifestations, Uremia.

INTRODUCTION

Chronic Kidney Disease (CKD) is a progressive condition characterized by irreversible loss of renal function, leading to accumulation of metabolic waste products and systemic complications [1]. The prevalence of CKD is increasing globally, primarily due to the rising incidence of diabetes mellitus and hypertension [2].

Dermatological manifestations are common in CKD patients and may occur at any stage of the disease. These manifestations arise due to metabolic imbalances, accumulation of uremic toxins, anemia, and altered immune responses [3]. Skin changes often serve as visible indicators of underlying systemic dysfunction and can significantly impact patients' quality of life [4].

Common cutaneous manifestations include xerosis, pruritus, hyperpigmentation, and pallor. Nail and hair abnormalities, as well as mucosal changes, are also frequently observed [5]. Uremic pruritus is one of the most distressing symptoms and affects a large proportion of patients undergoing dialysis [6].

The pathophysiology of these manifestations is multifactorial, involving xerosis due to decreased sweat and sebaceous gland activity, deposition of pigments, and secondary infections due to immunosuppression [7]. Additionally, anemia contributes to pallor, while metabolic disturbances may lead to nail and hair changes [8].

Previous studies have reported varying prevalence rates of dermatological manifestations in CKD patients, highlighting the need for region-specific data [9]. Understanding these patterns can help in early diagnosis and better management.
This study aims to evaluate the spectrum of dermatological manifestations in CKD patients and correlate them with the underlying etiological factors.

METHODOLOGY

Study Design:

This study was conducted as a hospital-based cross-sectional observational study aimed at evaluating the prevalence and spectrum of dermatological manifestations in patients diagnosed with Chronic Kidney Disease (CKD).

Study Setting and Duration:

The study was carried out in the Department of Nephrology of a tertiary care teaching hospital. The study was conducted over a period of 4-6 months.

Study Population and Sample Size:

A total of 100 patients diagnosed with CKD were included in the study. Patients were selected using a convenient sampling method from both inpatient and outpatient departments. CKD was defined and staged according to standard clinical guidelines based on estimated glomerular filtration rate (eGFR) and duration of kidney damage (≥3 months).

Inclusion Criteria:

- Patients aged ≥18 years diagnosed with CKD (all stages I–V)
- Patients of either gender
- Patients who provided written informed consent and were willing to participate

Exclusion Criteria:

- Patients with known primary dermatological diseases unrelated to CKD
- Patients receiving immunosuppressive therapy for other systemic illnesses (e.g., autoimmune disorders, malignancies)
- Patients with acute kidney injury (AKI)
- Patients who were critically ill or unable to undergo dermatological examination
- Patients unwilling to participate

Data Collection Procedure:

After obtaining approval from the Institutional Ethics Committee and informed consent from participants, data were collected using a predesigned and semi-structured case record form.

A detailed clinical history was obtained, including:

- Demographic details (age, gender)
- Duration of CKD
- Underlying etiology (e.g., diabetes mellitus, hypertension, chronic glomerulonephritis)
- History of dialysis (hemodialysis or peritoneal dialysis), if applicable
- Drug history and associated comorbid conditions

A comprehensive general physical and systemic examination was performed for each patient.

Dermatological Examination:

A thorough dermatological evaluation was carried out under adequate lighting conditions. The examination included inspection and, where necessary, palpation of the skin, hair, nails, and mucous membranes.

The following parameters were specifically assessed and documented:

- Skin manifestations: xerosis, pruritus, hyperpigmentation, pallor, uremic frost, ecchymosis, infections, and other lesions
- Hair changes: hair loss, dryness, brittleness, and texture changes
- Nail changes: half-and-half nails (Lindsay's nails), koilonychia, Beau's lines, onychomycosis
- Mucosal changes: oral ulcers, pallor, pigmentation changes, and other abnormalities

Where necessary, relevant laboratory investigations (such as hemoglobin levels, serum creatinine, blood urea, and electrolyte levels) were reviewed from patient records to support clinical findings.

Parameters Assessed:

- Age and gender distribution of patients
- Etiological factors contributing to CKD
- Duration and stage of CKD
- Frequency and type of dermatological manifestations involving:
  - Skin
  - Hair
  - Nails
  - Mucous membranes

Ethical Considerations:
The study protocol was reviewed and approved by the Institutional Ethics Committee prior to commencement. Written informed consent was obtained from all participants. Patient confidentiality and anonymity were strictly maintained throughout the study, and all procedures were conducted in accordance with ethical principles outlined in the Declaration of Helsinki.

Statistical Analysis: Data were analyzed using descriptive statistics and expressed as percentages.

RESULTS

The study included 100 patients, of which 56% were females and 44% were males. This indicates a slight female predominance among CKD patients in this study.

Table 1: Gender Distribution

Gender	No. of Patients (%)
Male	44 (44 %)
Female	56 (56 %)
Total	100 (100 %)

Diabetes mellitus was identified as the most common cause of CKD (36%), followed by chronic interstitial nephritis (26%) and hypertension (18%). Chronic glomerulonephritis accounted for 14% of cases. Less common causes included obstructive nephropathy (4%) and autoimmune disorders (2%).

Table 2: Etiology of CKD

Etiology	No. of Patients (%)
Diabetes	36 (36 %)
Hypertension	18 (18 %)
Chronic Interstitial Nephritis	26 (26 %)
Chronic Glomerulo Nephritis	14 (14 %)
Obstructive Nephropathy	4 (4 %)
Auto Immune	2 (2 %)

Xerosis was the most prevalent dermatological manifestation observed in 76% of patients. Pallor was present in 66% of patients, reflecting underlying anemia. Pruritus was noted in 48% of cases, while hyperpigmentation was seen in 42%. Nail changes were observed in 38% and hair changes in 32% of patients. Cutaneous infections were also reported in 32% of patients. Oral mucosal changes were less common (12%), and Kyrle's disease was observed in only 1% of patients.

Table 3: Cutaneous Manifestations

Skin Condition	No. of Patients (%)
Xerosis	76 (76 %)
Pallor	66 (66 %)
Pruritus	48 (48 %)
Hyperpigmentation	42 (42 %)
Nail Changes	38 (38 %)
Hair Changes	32 (32 %)
Infection	32 (32 %)
Oral Mucosal Changes	12 (12 %)
Kyrle's Disease	1 (1 %)

DISCUSSION

Chronic Kidney Disease is a multisystem disorder with diverse clinical manifestations, among which dermatological changes are highly visible and often under-recognized. These manifestations not only reflect the underlying metabolic and systemic disturbances but also significantly impair the quality of life due to symptoms like pruritus and cosmetic concerns. The spectrum of cutaneous findings varies depending on the stage of CKD, duration of illness, and treatment modalities such as dialysis. Therefore, understanding these manifestations is crucial for comprehensive patient care.

The present study demonstrates a high prevalence of dermatological manifestations among CKD patients, consistent with previous studies.

The female predominance observed in this study is comparable to findings by Udayakumar et al. [10], although some studies report male predominance, indicating that gender distribution may vary based on geographic and demographic factors.

Diabetes mellitus emerged as the leading cause of CKD, aligning with global trends reported in earlier studies [2,11]. Hypertension and chronic interstitial nephritis were also significant contributors, reflecting the changing epidemiological pattern of CKD.

Xerosis was the most common dermatological manifestation (76%), which is consistent with studies by Pico et al. and Singh et al. reporting prevalence rates between 60–90% [12,13]. This condition is primarily due to reduced activity of sweat and sebaceous glands, along with altered skin barrier function.

Pallor (66%) was also highly prevalent, reflecting anemia in CKD patients, as supported by earlier reports [14]. The reduced erythropoietin production in CKD contributes significantly to this finding.

Pruritus was observed in 48% of patients, which is comparable to findings by Narita et al. [15], though slightly lower than some dialysis-based studies. This variation may be due to differences in CKD stages, patient population, and treatment status.

Hyperpigmentation (42%) observed in this study is similar to previous findings and is attributed to increased melanin deposition and accumulation of β-melanocyte-stimulating hormone [16].

Nail changes (38%) and hair changes (32%) are consistent with studies by Bencini et al. [17], suggesting nutritional deficiencies, metabolic imbalance, and chronic illness as contributing factors.
Cutaneous infections (32%) were also significant, likely due to immunosuppression, frequent hospital exposure, and impaired skin integrity, as reported in previous literature [18].

Kyrle's disease was rare (1%), consistent with its known low prevalence among CKD patients [19], and is typically associated with advanced renal failure.

Overall, the findings of this study are in agreement with previous research, although slight variations exist due to demographic differences, environmental factors, and variations in healthcare access and management practices..

CONCLUSION

Dermatological manifestations are common and significant in patients with chronic kidney disease, presenting as a wide spectrum of cutaneous changes such as xerosis, pallor, pruritus, and hyperpigmentation, along with nail, hair, mucosal alterations, and infections. These changes reflect the underlying systemic and metabolic disturbances associated with CKD and demonstrate the extensive impact of the disease on the integumentary system. The predominance of diabetes and hypertension as major causes of CKD highlights their role not only in disease progression but also in contributing to these skin manifestations. Overall, such dermatological findings are closely linked to the pathophysiological changes in CKD and can act as useful clinical indicators for early recognition of disease progression and related complications, thereby emphasizing the importance of regular screening and timely management to improve patient comfort and quality of life.

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Conflicts of Interest
The authors declare that there are no conflicts of interest regarding the publication of this study.
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