

## Original Research Article

# Cutaneous manifestations in patients with chronic kidney disease on hemodialysis

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### ABSTRACT

**Background:** Chronic kidney disease (CKD) is associated with several cutaneous manifestations as a result of CKD per se, underlying disease(s) leading to it or the treatment thereof. Cutaneous manifestations get altered following hemodialysis. We studied the prevalence of various dermatoses and the effect on pruritus in patients with CKD on hemodialysis.

**Methods:** Seventy-three patients with CKD having at least one cutaneous manifestation undergoing hemodialysis in Dr. D.Y. Patil Medical College, Hospital and Research Centre, Pune were included.

**Results:** Sixty-four (87.67%) of the participants belonged to the age group of 40-69 years; 28 (38.35%), to the sixth decade. The male to female ratio was 1.8:1. Forty-eight patients (65.75%) suffered from diabetes mellitus, 37 of these also from hypertension. Xerosis (72.6%), pallor (65.8%) and pruritus (60.3%) were the common manifestations. The intensity of pruritus remained unchanged in 82% of those affected. Nail changes were seen in 47.9% cases (half-and-half nail, 19.2%; subungual hyperkeratosis, 11%; leukonychia, 6.8%; melanonychia, 6.8%; Beau's lines, 4.1%). Infections were observed in 32.8% cases (superficial mycoses, 19.2%; bacterial, 6.8%; scabies, 4.1%; viral, 2.7%). Dyspigmentation was documented in 30.1% (hyperpigmentation, 21.92%; yellow tinge, 8.22%), hair changes in 23.3% (sparse scalp hair, 16.4%; lusterless hair, 6.9%), acquired perforating dermatoses in 19.2%, and arteriovenous shunt dermatitis in 2.7% cases.

**Conclusions:** Xerosis was the commonest finding and pruritus, the commonest symptom; the intensity of the latter remained largely unaffected by hemodialysis. Half-and-half nail was the most common nail change and superficial mycoses, the most common infection.

**Keywords:** Chronic kidney disease, Hemodialysis, Xerosis, Pruritus, Acquired perforating dermatoses

### INTRODUCTION

Skin, the most accessible organ of the body, may be an important diagnostic window to the diseases affecting the internal organs, especially the renal system.<sup>1</sup> Primary disease processes leading to CKD and the various treatment modalities thereof including drugs, dialysis, and renal transplantation, etc., can also produce skin lesions in these patients.<sup>2</sup>

With increasing access to hemodialysis, the most frequent skin findings such as uremic frost and erythema palpatum uremicum encountered in the pre-dialysis era are rarely seen now. On the other hand, prolonged life expectancy of patients following prompt management provides time for the development of newer cutaneous manifestations.<sup>3</sup> Cutaneous changes such as pruritus, xerosis, hyperpigmentation, perforating disorders, half-and-half nails, absent lunulae and onychomycosis can be present before as well as after the initiation of hemodialysis.<sup>4</sup>

Uraemic pruritus (UP), affecting close to 90% of dialysis patients, corresponds to increased morbidity and mortality.<sup>5</sup> It has a negative effect on patients' quality of life, sleep, emotional state, and social relations.<sup>6,7</sup> Pruritus also contributes to the development of skin and soft tissue lesions and/or infections.<sup>7</sup>

We undertook this study in the patients of CKD on maintenance hemodialysis in Dr. D.Y. Patil Medical College, Hospital and Research Centre, Pune to determine the prevalence of cutaneous manifestations, to compare these with similar changes in other studies and to document the effect of hemodialysis on pruritus associated with CKD.

**METHODS**

After obtaining clearance from Institutional Ethics Committee, this cross-sectional, descriptive study was conducted from September 2018 to August 2020 at the dialysis unit of our institution on consenting patients with CKD on hemodialysis with at least one cutaneous manifestation. The patients undergoing hemodialysis after renal transplantation or after acute kidney injury and those undergoing peritoneal dialysis were excluded.

A total of 73 consecutive patients who met the above criteria participated in this study.

Detailed history and clinical findings were recorded in a predetermined proforma. Significant findings were photographed. Investigations including skin biopsy were done wherever required. Statistical analysis of the data was carried out using MS excel 2019.

**RESULTS**

Our study participants (47, males; 26, females: 1.8: 1) belonged to third to eighth decades (21 to 73 years); mean age, 50.97 years (standard deviation, 10.87 years). Maximum prevalence, 28 cases (38.35%), occurred during the sixth decade; followed by 24(32.88%) in the fifth; and 12 (16.44%) in the seventh.

**Table 1: Prevalence of various cutaneous changes seen in our study.**

Cutaneous change	No.	Percentage (%)
<b>Xerosis</b>	53	72.6
<b>Pallor</b>	48	65.8
<b>Pruritus</b>	44	60.3
<b>Dyspigmentation</b>	22	30.1
<b>Acquired perforating dermatoses</b>	14	19.2
<b>Infections and infestations</b>	24	32.8
<b>Nail changes</b>	35	47.9
<b>Hair changes</b>	17	23.3
<b>AV shunt related</b>	2	2.7

Fifth to seventh decades accounted for 64 (87.67%) cases.

Diabetes was the most common underlying disease (48; 65.75%) leading to CKD; 37 of these (77%) also had hypertension. Twenty-one (28.77%) participants had hypertension exclusively and 4 (5.48%), adult polycystic kidney disease.



**Figure 1: Xerosis over extensor aspects of legs.**



**Figure 2: Acquired perforating dermatosis manifesting over legs as hyperkeratotic papules with a central plug.**



**Figure 3: Half-and-half fingernails.**



**Figure 4: Sparse hair on scalp.**

Of the investigations done in all patients: hemoglobin was decreased (mean, 8 gm%; S.D= 1.5 gm%), blood urea increased (mean, 112.7 mg; S.D=38.74 mg/dl), and serum creatinine increased (mean, 9.43 mg/dl; S.D=5.15 mg/dl).



**Figure 5: Dry, lusterless hair on scalp.**

The cutaneous changes recorded were as tabulated (Table 1).

## DISCUSSION

A male preponderance ranging from 63% to 77% has been recorded in other studies.<sup>3,8-10</sup> The mean age of our study participants was 50.97 years, 87.67% of cases being above 40 years. Studies by Sultan et al<sup>8</sup> and Deshmukh SP et al have recorded mean age of 49.53 years and 48.77 years, respectively.<sup>10</sup>

Pruritus, the commonest symptom in our study, affected 44 (60.3%) patients; legs, arms and back were the usual sites. Its prevalence among hemodialysis patients has ranged from 19% to 90% and severity, more marked in diabetic patients.<sup>2,3,8,10-14</sup> Pruritus is not present in acute renal failure, does not necessarily subside with dialysis, although it improves with kidney transplantation.<sup>15</sup>

The pruritus seen in 44 of the study participants was unchanged in majority (36;82%), as also recorded in some previous studies; worsened in 5 (11%) and reduced in 3 (7%) cases.<sup>10,13</sup> This non-responsiveness of pruritus to hemodialysis is due to the latter's inability to clear the blood of the pruritogenic middle molecular weight substances (range 300-12000 daltons), like  $\beta_2$  microglobulin, advanced glycosylation end products, and parathyroid hormones.<sup>13,16</sup>

Xerosis (Figure 1), the commonest finding in our study, was present in 53(72.6%) patients, 37 of these with widespread involvement happened to be diabetics. Xerosis has been documented as the commonest cutaneous manifestation (46% to 90%) in patients of CKD in many previous studies; occurs predominantly over the extensor surfaces of the forearms, legs and thighs.<sup>2,3,8-10,14,18,19</sup> In CRF it may be due to a complication of diabetes, sweat gland atrophy, secondary to high dose diuretic regimens, elevated plasma vitamin A, elevated retinol binding

protein, alkalinity of skin, and protein-calorie malnutrition owing to dietary restrictions.<sup>12,19-23</sup>

Pallor due to anemia, the second common finding in our study participants (48; 65.8%), has been reported as the hallmark of patients with CRF.<sup>3</sup> It is a common and early finding and significantly adds to their mortality.<sup>24</sup> Udaykumar et al and Deshmukh SP et al found the prevalence of pallor as 60% and 68.57% in their respective studies.<sup>3,10</sup> Anaemia is primarily due to inadequate erythropoietin production by the failing kidneys. Other contributory factors include deficiencies of iron, folic acid or vitamin B12 and decreased erythrocyte survival.<sup>25</sup>

Two types of pigmentary changes were seen in this study i.e., diffuse brown hyperpigmentation, mainly over sun exposed areas in 16 (21.92%) patients and yellow tinge of the face in 6 (8.22%) patients. Thus, dyspigmentation was documented in 22 (30.14%) patients. Other studies have reported the prevalence of hyperpigmentation as 20% to 43%.<sup>3,8-10,12,14</sup> Diffuse hyperpigmentation of sun exposed areas is caused by increased melanin in the basal layer and superficial dermis due to failure of kidney to excrete B-melanocyte stimulating hormone (B-MSH).<sup>26</sup> The prevalence of yellowish tinge to the skin has been reported as 10% to 11% in Indian studies and 22% to 40% by foreign studies.<sup>3,8,10,12</sup> This discrepancy is probably because of the darker complexion in Indians.<sup>3</sup> Yellow tinge may be due to accumulation of carotenoids and nitrogenous pigments (urochromes) in the dermis<sup>20</sup> or the presence of lipochromes and carotenoids in the epidermis and subcutaneous tissues.<sup>21</sup>

Acquired perforating disorders (APD) such as perforating folliculitis, Kyrle disease and reactive perforating collagenosis have been described in CRF. Perforating disorder of renal disease or acquired perforating disorders have been used to describe the hyperkeratotic follicular papules present in these patients.<sup>29</sup> APD (Figure 2) was observed in 14 (19.2%) of our study participants, 10 of these (71.4%) had lesions on the extensor aspect of legs. The prevalence of APD in CRF patients on hemodialysis has ranged from 3% to 21%.<sup>3,8-10</sup> All patients affected with APD in our study were diabetic. The association of diabetes mellitus and perforating disorders has been confirmed by earlier studies.<sup>3,14</sup>

Cutaneous infections were seen in 24 (32.8%) patients in our study comprising of 14, superficial mycoses (19.2%); 5, bacterial (6.8%); 3, scabies (4.1%) and 2, herpes zoster (2.7%). The prevalence of infections in previous studies has ranged from 27% to 40%.<sup>3,8-10</sup> Several studies have documented fungal infection as the most common infection in CRF patients on hemodialysis with its prevalence ranging from 16% to 33%.<sup>3,8-10</sup> CRF patients are more susceptible to infections because of depressed neutrophil, T and B lymphocytes function, leucopenia, impaired phagocytosis, reduced natural killer cell activity and inflammation caused by non-sterile dialysate and non-biocompatible membranes.<sup>12</sup>

Nail changes present in 35 (47.9 %) of our study participants included half-and-half nail (Figure 3) in 14 (19.2 %), subungual hyperkeratosis in 8 (11%), leukonychia in 5 (6.8%), melanonychia in 5 (6.8%) and Beau's lines in 3 (4.1%) cases. In half-and-half nails, the white appearance of proximal half of the nail is due to nail bed oedema associated with a dilated capillary while the other half of the nail bed appears normal.<sup>30</sup> Its prevalence in general population has been reported to be 1.4%.<sup>12</sup> Other studies have also found half-and-half nails as the most common nail change in patients of CRF on hemodialysis.<sup>3,4</sup>

Hair changes were present in 17 (23.3%) patients; 12 (16.4%) had sparse scalp hair (Figure 4) and 5 (6.9%), dry lusterless hair (Figure 5) which is due to decreased secretion of sebum in CRF patients.<sup>31</sup> Sultan et al. found sparse scalp hair in 46% and dry lusterless hair in 47% of their patients while, Udayakumar et al found sparse scalp hair in 11% and dry hair in 16% of their cases.<sup>3,8</sup>

Arteriovenous shunt dermatitis was seen in 2 (2.7%) patients. It was seen in 8% of patients on long term hemodialysis and is characterised by irritant contact dermatitis from soap, disinfectants and alcohol used for skin cleansing.<sup>32</sup> Udayakumar et al reported shunt dermatitis in 2% of their study patients.<sup>3</sup>

Other rare manifestations of CRF such as uremic frost, calciphylaxis, bullous dermatoses of hemodialysis, pseudo-Kaposi sarcoma and nephrogenic systemic fibrosis documented in other studies were not seen in this study.<sup>8,12,15,32-34</sup>

### Limitations

Our study was limited by a small sample size and collection of cases from a single tertiary hospital.

### CONCLUSION

In our study, xerosis, pallor, pruritus and nail changes were the most common manifestations in patients with CKD on hemodialysis. Pruritus was not relieved by hemodialysis in majority of the patients. Xerosis was common and extensive in patients with diabetes. Superficial mycoses were the most frequent infection observed. All cases of acquired perforating disorders in our study were diabetics.

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