

# Dermatological manifestations in patients with chronic kidney disease: A cross sectional study

<sup>1</sup>Bindushree R, <sup>2</sup>Priyashree R

<sup>1</sup>Assistant Professor, Department of Dermatology, The Oxford Medical College and Hospital, Bangalore, Karnataka, India

<sup>2</sup>Assistant Professor, Department of Nephrology, Rajarajeshwari Medical College and Hospital, Bangalore, Bangalore, Karnataka, India

**Corresponding Author:**  
Priyashree R

## Abstract

**Introduction:** Chronic kidney disease (CKD) is associated with a complex array of cutaneous manifestations caused either by the disease or by treatment. Cutaneous manifestations in chronic kidney disease are polymorphic and diverse. Most patients with severe CKD progress to end stage renal disease (ESRD) with significant morbidity and mortality. The Aim of our study was to evaluate the prevalence and pattern of cutaneous disorders among patients with chronic kidney disease.

**Materials and Methods:** One hundred patients of chronic kidney disease above the age of 18 years with dermatological manifestation were enrolled in the study. A detailed physical examination and dermatological examination was done and findings recorded. Relevant investigations including complete haemogram, diabetic profile, ANA, renal function tests, Liver function tests, electrolytes, viral markers, serum calcium, phosphorous and PTH (parathormone) levels, KOH mount, culture & sensitivity, woods lamp examination, biopsy was done if indicated.

**Results:** In our study we included 100 patients of CKD with cutaneous manifestations. The most common cause of CKD in our study was found to be diabetic nephropathy which was seen in 47% (n=47) patients. Pruritus was the most common dermatological manifestation seen in 73% (n=73) of the total study population followed by xerosis in 68% (n=68). More than 50% of the study population had more than one dermatological manifestations. Nail and hair changes was seen in 43% and 58% respectively.

**Conclusion:** Patients with end stage renal disease (ESRD) may present with variety of skin abnormalities and the most common being pruritus and xerosis as seen in our study. An inter-disciplinary approach involving dermatologists and nephrologists is essential to improve the quality of life of patients with ESRD.

**Keywords:** Chronic kidney disease, pruritus, hemodialysis, end stage renal disease, cutaneous manifestation

## Introduction

Chronic kidney disease (CKD) is a progressive loss of kidney function over a period of months or years and is divided into five stages <sup>[1]</sup>. Chronic kidney disease (CKD) is defined as kidney damage or glomerular filtration rate <60 ml/min/1.73 m<sup>2</sup> for 3 months. Most patients with severe CKD progress to

end-stage renal disease (ESRD) with significant morbidity and mortality [2]. About 50-100% patients with ESRD have at least one associated cutaneous change [3]. CKD is associated with a complex array of cutaneous manifestations caused either by the disease or by treatment. Cutaneous manifestations in renal failure are polymorphic and diverse. Non-specific cutaneous disorders include pigmentary changes, pruritus, xerosis, acquired ichthyosis and half-and-half nail. Specific disorders include acquired perforating dermatosis, calciphylaxis, bullous dermatoses and fibrosing dermopathy of uremia [4, 5]. Although many of the patients with end-stage renal disease (ESRD) can improve their quality of life by hemodialysis, in case of denying kidney transplantation, prolonged hemodialysis itself will be associated with certain cutaneous and mucosal complications or changes in the type of dermatologic involvement and manifestations [6]. Dermatological manifestations in ESRD are varied and can impair the quality of life. Prompt diagnosis may help to ensure treatment which can in turn reduce the disease associated morbidity [7]. Some prophylactic and remedial measures can prevent or decrease some of the adverse changes. These include emollients for xerosis; sunscreens and sun avoidance measures for pigmentary changes and cutaneous malignancies; oral hygiene to prevent oral mucosal changes; nutritional supplementation to prevent vascular fragility, angular cheilitis and hair loss; and prompt recognition and treatment of fungal infections like onychomycosis and tinea pedis, which are seen with increased incidence in CKD [7, 8]. Our study was conducted to evaluate the prevalence and pattern of cutaneous disorders among patients with chronic kidney disease.

## Materials and Methods

The study was undertaken from June 2020 to December 2021. One hundred patients of chronic kidney disease above the age of 18 years with dermatological manifestation, attending Dermatology or Nephrology OPD at a Tertiary Hospital located in south India were enrolled in the study. CKD was diagnosed on the basis of GFR estimation. Patients on maintenance hemodialysis were also included irrespective of the etiology of CKD. A detailed clinical history including demographic details, comorbidities, cause of CKD, family history, drug history, duration on Hemodialysis, previous history of skin diseases, were recorded in a proforma after obtaining informed consent from each individual patient. A detailed physical examination and dermatological examination was done and findings recorded. Relevant investigations like complete haemogram, diabetic profile, ANA, renal function tests, Liver function tests, electrolytes, viral markers, serum calcium, phosphorous and PTH levels, KOH mount, culture & sensitivity, wood s lamp examination, biopsy was done when indicated.

Data were entered in Microsoft Excel and analyzed with SPSS version 16.0. We compared the dermatological manifestations in patients receiving conservative treatment with patients on hemodialysis and also between diabetic CKD and non-diabetic CKD by Pearson's Chi-square test.  $P < 0.05$  was considered as statistically significant.

## Results

In our study we included one hundred patients of CKD with cutaneous manifestations. Males comprised of 65% (n=65) and females accounted for 35% (n=35) of the study population. Male to female ratio was 1.8:1. Mean age among the males was  $46.8 \pm 13.6$  years and among females was  $49.2 \pm 14.5$  years.

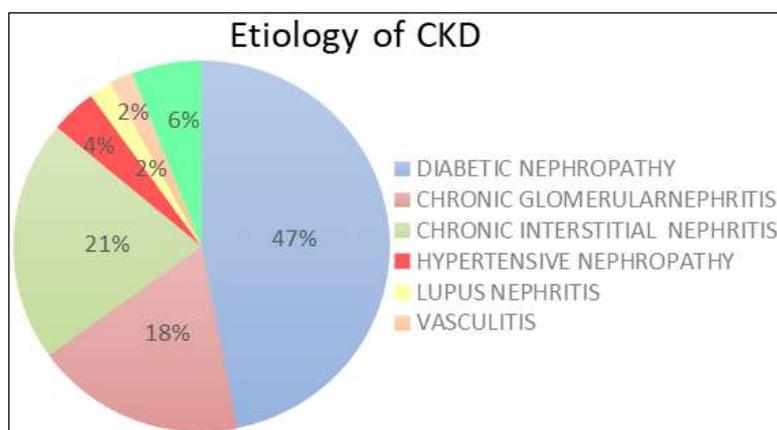
Among the study group 42% (n=42) were on maintenance haemodialysis (MHD). 23.8% (n=10) were on MHD for < 1 year, 35.7% (n=15) were on MHD of 1-5 years duration with a mean of  $3.4 \pm 2$  years and 40.4% (n=17) were on haemodialysis of > 5 years duration with mean of  $8.4 \pm 4.2$  years. 58% (n=58) were on conservative management for CKD, among them 13% (n=13) had CKD stage 3, 21% (n=21) had CKD stage 4 and 24% (n=24) had CKD stage 5.

The most common cause of CKD in our study was found to be diabetic nephropathy which was seen in 47% (n=47) of the total study population followed by chronic interstitial nephritis (CIN) which was seen in 21% (n=21) and chronic glomerulonephritis (CGN) seen in 18% (n=18). Hypertensive

nephrosclerosis was seen in 4% (n=04), lupus nephritis and systemic vasculitis seen in 2% (n=02) each of the study group. In 6% (n=06) of the patients no known cause was detected. (Figure 01)

Mean haemoglobin was found to be  $7.3 \pm 3.8$  g/dl. Mean serum calcium was  $7.2 \pm 3.8$  mg/dl and 74% (n=75) of the total study population were on calcium supplementation. Mean serum phosphorous was  $5.2 \pm 3.6$  mg/dl. Mean Parathormone (PTH) levels were  $526 \pm 213$  pg/ml.

Pruritus was the most common dermatological manifestation seen in our study in 73% (n=73) of the total study population followed by xerosis in 68% (figure 05) (n=68). More than 50% of the study population had more than one dermatological manifestations. Generalized hyperpigmentation was seen in 32% (n=32), chronic eczema in 20% (n=20), acquired ichthyosis in 14% (n=14), Acquired perforating dermatosis in 7% (figure 04) (n=07), purpura and ecchymosis in 5% (n=05), bullous dermatosis in 3% (n=03), calciphylaxis in 01 patient. (Table 01)



**Fig 1:** Pie Diagram Showing Etiology of Chronic Kidney Disease

**Table 1:** Skin Changes in Patients of Chronic Kidney Disease

Skin Changes	No. of Patients (n=100)	Percentage (%)
Pruritus	73	73
Xerosis	68	68
Hyperpigmentation	32	32
Eczema	20	20
Acquired perforating dermatoses	07	7
Purpura/Ecchymosis	05	5
Calciphylaxis	01	1
Acquired ichthyosis	14	14
Bullous dermatoses	03	3
Herpes zoster	02	2
Candida infection	10	10
Dermatophytosis	35	35
Bacterial infection	06	6

Among the dermatological infections dermatophytosis was most common seen in 35% of the total study population. Candida infection (oral and skin) was seen in 10% (n=10) (Figure 02), bacterial infections was seen in 6% (n=06) and herpes zoster in 2% (n=02) patients.

Nail changes were seen in about 43% (n=43) of the total population. Most commonly seen nail change was onychomycosis in 58% (n=25), nail dystrophy in 18.6% (n=08), subungual hyperkeratosis in 11.6% (n=05), onycholysis in 9.3% (n=04) and half and half nail was seen in 51.1% (n=22) of the total population in association with other skin changes. (Table 02)



**Fig 2:** Severe Seborrheic Dermatitis Seen in a CKD Patient



**Fig 3:** Candidal Intertrigo with Erosion in CKD Patient



**Fig 4:** Perforating Folliculitis with Keratotic Papules over the Legs in a Diabetic CKD Patient



**Fig 5:** Xerosis in a CKD Patient

**Table 2:** Nail Changes in Patients with Chronic Kidney Disease

Nail Changes	No. of Patients (n=43)	Percentage (%)
Half and Half nail	22	51.1
Onychomycosis	25	58
Onycholysis	04	9.3
Subungual hyperkeratosis	05	11.6
Nail dystrophy	08	18.6

Hair changes were seen in 47% (n=47) of the total study group. More than one change was seen in majority of them. Brittle hair in 79% (n=37), premature canities in 44.6% (n=21), Telogen effluvium in 12.7% (n=06) and seborrheic dermatitis in 4.2% (n=02). (Table 03)

**Table 3:** Hair Changes in Patients with Chronic Kidney Disease

Hair Changes	No of Patients (n=47)	Percentage (%)
Brittle hair	37	79
Premature greying	21	44.6
Telogen effluvium	06	12.7
Seborrheic dermatitis	02	4.2

When we compared the dermatological manifestations in CKD patients undergoing MHD with those who were on conservative management, we found that the prevalence of cutaneous manifestations including skin, hair and nail changes was more in those undergoing hemodialysis i.e. 68%, CKD stage 3 had prevalence of 6%, CKD stage 4-10% and CKD stage 5-16%. This high prevalence among patients on hemodialysis was statistically significant with  $p < 0.05$  as compared to those on conservative management.

Though diabetics constituted majority of our study population i.e. 47%, comparison of dermatological manifestations between those who had CKD due to diabetes and those who had CKD due to other causes did not show statistical difference. ( $p > 0.05$ ).

## Discussion

Dermatological manifestations in CKD patients is varied and severity of which can vary from mild to severe, disturbing the life style of patients. These features can be under diagnosed and hence prompt and timely identification and intervention can improve quality of life in this population.

We included 100 subjects with CKD including those on Haemodialysis. 42% were on MHD and 58% were on conservative management, similar to a study by Navya Sahadevan *et al.* [8] from south India which also included 100 subjects but majority 61% were on MHD and 39% on conservative management. Males constituted majority of our study group of about 65% with the mean age of  $46.8 \pm 13.6$ , females constituted 35% and the mean age among them was  $49.2 \pm 14.5$  years. Similar to a study by Uday Kumar P *et al.* [7] where males constituted 70% of the study group and females-30% with the mean age being 45 years.

In our study, among those on MHD(42%), majority of them i.e. 40.4% were on hemodialysis of  $> 5$  years duration with a mean of  $8.4 \pm 4.2$  years, in contrast to a study done by rashpa *et al.* [2] in which the mean duration of haemodialysis was  $9.3 \pm 9$  years which was higher than our study. The most common cause of CKD in our study was found to be diabetic nephropathy which was seen in 47%, similar to study by Navya Sahadev *et al.* [8] where diabetic nephropathy was seen in 49% of their total study population. In another study by rashpa *et al.* [2] diabetics constituted 56.6% of their study group.

Mean haemoglobin was found to be  $7.3 \pm 3.8$ g/dl in our study similar to a study done by Praveen kumar *et al.* [9] in which the Mean haemoglobin was found to be  $7.8 \pm 3.1$ g/dl.

Pruritus was the most common dermatological manifestation seen in our study in 73% ( $n=73$ ) of the total study population followed by xerosis in 68% ( $n=68$ ). Similar observation was noticed in previous studies with a prevalence of 40-90% [10]. High dosage of diuretics, atrophy of sweat glands and excessive ultra-filtration during haemodialysis might be responsible for the above manifestation.

Generalized hyperpigmentation was seen in 32% ( $n=32$ ) in our study with similar reported prevalence of 22-54% [11, 12].

Other dermatological lesions found in our study were chronic eczema in 20%, acquired ichthyosis in 14%, Acquired perforating dermatosis in 7%, purpura and ecchymosis in 5%, bullous dermatosis in 3% and calciphylaxis in 01 patient. Similar lesions were found in other studies [13-16].

Among the dermatological infections dermatophytosis was most common seen in 35% of the total study population. Similar to a study done by rashpa *et al.* which also showed that the fungal infections were seen in about 38.5% of their study group. Prevalence in other studies have found to be 28-70% due to increased susceptibility for bacterial, fungal and viral cutaneous infections due to reduced immunity [17, 18]. Among the nail and hair changes most commonly seen was onychomycosis in 58% and brittle hair was in 79% of our study group, which corroborates with the reported prevalence of 30-70% [19, 20].

In our study we found high prevalence of dermatological manifestations among patients on haemodialysis which was statistically significant with  $p < 0.05$  as compared to those on conservative management. This was in contrast to a study done by rashpa *et al.* [2] where higher incidence of dermatological manifestations were seen in CKD stage 5 disease probably because of higher number of patients included belonged to CKD stage 5. In another study with large sample size by pisoni *et al.*, [21] independent and strong relationships were noted between pruritus and elevated levels of serum phosphorus, serum calcium and serum calcium phosphorus product, though we did not find any significant relation between them.

## Conclusion

Patients with end stage renal disease (ESRD) may present with a variety of skin abnormalities and the most common being pruritus and xerosis as seen in our study and previous studies. Some prophylactic and remedial measures can prevent or decrease some of the adverse changes. Long follow up is needed to reduce the morbidity associated with dermatoses. An inter-disciplinary approach involving dermatologists and nephrologists is essential to improve the quality of life of patients with ESRD.

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