

# An Observational Study of Dermatological Manifestations in Patients of Chronic Renal Failure Undergoing Hemodialysis

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## Abstract

**Background:** Chronic Renal Failure (CRF) patients develop myriad of cutaneous findings. Novel cutaneous changes are being described since the introduction of hemodialysis, which prolongs the life expectancy, and thus more time for the skin changes to develop. **Aims & Objectives:** We aimed to evaluate the prevalence of dermatologic manifestations among the patients suffering from Chronic Renal Failure (CRF) who are on hemodialysis. **Methods:** 93 patients with CRF receiving hemodialysis were evaluated for skin, hair and nail changes. **Results:** All the enrolled patients experienced some skin problem. The most prevalent cutaneous manifestation was xerosis (54.8%), followed by pallor (21.5%), pruritus (19.35%) and dyspigmentation (18.3%). Other dermatologic manifestations included Kyrle's disease (5.4%); fungal (5.4%), bacterial (6.5%) and viral (3.2%) infections and purpura (9.7%). Recorded nail changes were half and half nail (21%), koilonychia (39.78%), onychomycosis (1.08%), onychorrhexis (6.45%), splinter hemorrhages (1.08%), and Beau's lines (2%). Hair changes included sparse hair (18.28%), and brittle and lustreless hair (11.83%). Oral cavity manifestations were enlarged tongue with teeth indentations (23.65%). **Conclusions:** CRF is associated with multiple skin, hair and nail manifestations caused either by the CRF or by its therapy. The commonest cutaneous changes were xerosis and pruritus.

**Keywords:** Dyspigmentation, Koilonychia, Onychomycosis, Pruritus, Xerosis

## 1. Introduction

The kidney and the skin are the two organs which require large blood supply, far in excess of their nutritional demands. Hence, skin and kidney share many diseases<sup>1</sup>. Since last 10 years, patients suffering from end stage renal disease have increased.

Chronic Renal Failure (CRF) is defined as decrease in renal function for more than 3 months and with GFR less than 15 ml/min/1.73 metre square. It presents with an array of cutaneous manifestations. In the second-half of the 20<sup>th</sup> century discovery of renal replacement therapy

has improved life expectancy of many individuals. Newer mucocutaneous changes have been documented since the discovery of hemodialysis, which extends life, and thus giving time to manifest these changes<sup>2</sup>.

These manifestations are either due to the disease or from the treatment. The presence of skin conditions adds to the disease load and complicates the management of these patients. Thus, the hospital stay, cost and man power required increases.

The most common skin ailments are xerosis, pallor, pruritus, cutaneous pigmentation, kyrle's disease, fungal, bacterial and viral infections, uremic frost, purpura,

gynaecomastia<sup>1</sup>. Various nail manifestations include koilonychia, Mees lines, Muehrcke's lines, half and half nail, onychomycosis, splinter hemorrhages, and Beau's lines<sup>1</sup>. Hair changes include less body and scalp hair<sup>1</sup>. Oral cavity findings include macroglossia with teeth indentations, dry mouth, angular cheilitis and uremic breath<sup>1</sup>.

Cutaneous examinations of patients with end stage renal disease has shown that 50–100 % of the patients have at least on edermato logic condition.

In addition to end stage renal disease, uremia and other entities linked with replacement therapy and dialysis are associated with many specific cutaneous disorders.

We sought out to study the commonest skin ailments in chronic renal failure patients on hemodialysis, coming to our tertiary centre, to understand which cutaneous manifestations to expect and to look for them at an early stage.

This will reduce the co-morbidities that exist in these already debilitated patients, thus providing them with reduced hospital stay and better health care.

## 2. Aims and Objectives

- To study the prevalence of dermatological manifestations in patients with chronic renal failure on hemodialysis.
- To study the co-morbidities affecting chronic renal failure and mucocutaneous features in these patients.

## 3. Materials and Methods

The study was conducted in the Dialysis Centre of MVP's Dr. Vasantrao Pawar Medical College, Hospital and Research Centre, Nashik. The diagnosed cases of chronic renal failure from the Nephrology unit, who were on hemodialysis were enrolled in this study. The study period was 12 months from October 2017 to October 2018.

Ethical committee clearance was taken before the start of this study. Subjects were enrolled in the study after taking a written and informed consent.

A detailed history regarding name, age, gender, medical diagnosis and medications were noted. History regarding onset, duration, progression of CRF and the duration of dialysis was documented. Present dermatological manifestations, the duration of skin ailments, the apparent changes with relation of starting dialysis were recorded. Related history of medical co-morbidities was mentioned.

A thorough general examination was done. The skin, hair, nails and mucosa were examined thoroughly for

- Specific dermatological lesions of chronic kidney disease.

- New skin lesions or changes in previous lesions after starting dialysis.
- Presence of cutaneous infections.

Specific investigations like following were performed where indicated after written informed consent.

- Wood's lamp examination.
- Scraping of skin for direct microscopic examination with 10% KOH for evidence of superficial mycosis in affected patients and fungal culture if needed in selected cases.
- Skin biopsy for Histopathologic Examination in selected cases.

Selected cases were investigated as follows up and treated accordingly.

## 3.1 Eligibility Criteria

### 3.1.1 Inclusion Criteria

- Confirmed chronic renal failure patients diagnosed by the department of medicine who are on hemodialysis.
- Patients belonging to any age group.
- Patients who gave consent.

### 3.1.2 Exclusion Criteria

- Patients who have had renal transplant.
- Patients on peritoneal dialysis.
- Unwilling patients.

## 4. Results

In our present study, all 93, (100%) patients had one or the other cutaneous manifestations

**Table 1.** Age distribution of CRF patients on hemodialysis

Age in Years	No of patients	Percentage
<20	03	3.22%
21–30	09	9.68%
31–40	14	15.05%
41–50	25	26.88%
51–60	16	17.20%
61–70	24	25.81%
71–80	02	2.15%
Total	93	100%

In present study out of 93 patients on dialysis, majority of patients, 25(26.88%) were in the age group of 41–50 followed by 24 patients (25.81%) in the age group of 61–70 (Table 1) males (59.14%) and 38 were females (40.86%) and male to female ratio was 1.45 : 1.

**Table 2.** Risk factors of CRF among study patients

Causes of CRF	No of patients	Percentage
Systemic infections.	02	2.15%
Diabetes mellitus	33	35.48%
Hypertension	27	29.03%
Glomerulonephritis	18	19.35%
Pyelonephritis	03	3.24%
Unknown	10	10.75%
Total	93	100%

In present study out of 93 patients on dialysis the most common risk factor was diabetes mellitus (35.48%) (Table 2)

**Table 3.** Skin changes seen in CRF patients on hemodialysis patients

Skin Changes	No of Patients (N = 93)	Percentage
Xerosis	51	54.8%
Palmar Pallor	20	21.5%
Pruritis	18	19.35%
Pigmentation	17	18.3%
Ichthyosis	10	10.8%
Purpura	09	9.7%
Acquired perforating dermatosis	05	5.4%
Calcinosis cutis	03	3.2%
actinic Keratoses	02	2.2%
Herpes zoster infection	03	3.2%
P. versicolor	03	3.2%
T. cruris	02	2.2%
Intertrigo	04	4.3%
Pyoderma	06	6.5%
Hypertrophic scar at AV shunt	01	1.1%
Abscess at AV shunt	01	1.1%
Aneurysm at AV shunt	01	1.1%

In present study out of 93 patients on dialysis, 51 patients (54.8%) presented of xerosis 20 patients (21.5%) had pallor. 75 patients (80.65%) did not complaint of pruritus

In present studies, 17 patients (18.3%) had hyperpigmentation over exposed areas.

In present study out of 93 patients on dialysis, 10 patients (10.8%) had ichthyosis

In present study out of 93 patients on dialysis, 9 patients (9.7%) had purpura or ecchymosis. In the present study, 5 patients (5.4%) had acquired perforating dermatosis like kyrle’s disease uremic follicular hyperkeratosis and 88 patients (94.6%) did not have any acquired perforating dermatosis.

In present study out of 93 patients on dialysis, 06 patients (6.5%) had pyodermas, 04 (4.3) patients had intertrigo, 03 patients (3.2%) had herpes simplex virus infection, 03 patients (3.2%) had pityriasis versicolor infections, and 02 patients (2.2%) had tinea cruris and corporis infections.

At dialysis site, complications like hypertrophic scar was seen in 1 patient (1.1), abscess was seen in 1 patient (1.1%), and aneurysm were present in 1 patient (1.1%). (As shown in Table 3).

**Table 4.** Hair, nail and oral changes in CRF patients on hemodialysis

Hair changes	No of patients (N = 93)	Percentage
Sparse hair	17	11.83%
Lustreless hair	11	18.28%
Nail Changes	No of patients (N = 93)	Percentage
Koilonychia	37	39.78%
Half and half nail	15	16.13%
Clubbing	08	8.60%
Onychorrhexis	06	6.45%
Melanonychia	05	5.38%
Beau’s line	04	4.30%
Shiny nail	02	2.15%
Yellow nail	02	2.15%
Onychomycosis	01	1.08%
Pitting	01	1.08%
Splinter haemorrhage	01	1.08%
Leuconychia	01	1.08%
Oral Changes	No of patients (N = 93)	Percentage
Macroglossia	22	23.65%
Coated tongue	10	10.75%
Candidiasis	04	4.31%
Bald tongue	03	3.23%
Pallor	02	2.15%

Among the dialysis group, similar findings like thin and lustreless scalp hairs were observed in 17 (18.28%) and 11 patients (11.83%) respectively.

The most common nail finding noted was koilonychia 37 (39.78%) followed by half and half nail (16.13%).

22 patients (23.65%) presented with macroglossia, which was the most common finding followed by coated tongue which was observed in 10 patients (10.75%) (As shown in Table 4).

**Table 5.** Skin changes and corresponding duration of hemodialysis

Skin changes	<6 months (30)	6-1 yr (24)	1-5 yrs (36)	5-10 yrs (3)
Xerosis	15(29.41%)	16 (31.37%)	20 (39.22%)	0
Pallor	5(25%)	8 (40%)	7 (35%)	0
Pigmentation	2(15.38%)	1 (7.69%)	10 (76.92%)	0
Acquired perforating dermatosis	1(20%)	1 (20%)	3 (60%)	0
Pruritis	1(5.55%)	5 (27.77%)	10 (55.55%)	2 (11.11%)
Half and half Nail	2(13.33%)	4 (26.66%)	7 (46.66%)	2 (13.33%)
Sparse hair	5(29.41)	4 (23.53%)	8 (47.06%)	0

Xerosis (39.22%) was more in dialysis patients of 1-5 years. Pallor was evident in 40% dialysis patients of 6 months to 1year duration. Pigmentation (76.92%), acquired perforating disorder (60%), pruritis (55.5%) half and half nail (46.66%) and sparse hair (47.06%) were more in dialysis patients of 1-5 years duration (As shown in Table 5).

**Table 6.** Prevalence of Diabetes mellitus and hypertension among various cutaneous manifestations in CRF patients on hemodialysis

Skin Changes	DM Patients	HTN Patients
Xerosis (N = 51)	21 (41.17%)	13 (25.49%)
Pallor (N = 20)	6 (30%)	6 (30%)
Pigmentation (N = 17)	6 (35.29%)	3 (17.64%)
Acquired perforating dermatosis (N = 05)	4 (80%)	1 (20%)
Pruritis (N = 18)	10 (55.55%)	4 (22.22%)
Half and half nail (N = 15)	8 (53.33%)	2 (13.33%)
Sparse hair (N = 17)	10 (58.82%)	2 (11.76%)
Oral Candidiasis (N = 04)	3 (75%)	3 (13.63%)
Macroglossia (N = 22)	13 (59.09%)	13 (25.49%)

In present study, acquired perforating dermatoses (80%), pruritis (55.55%) half and half nails (53.33%) were more prevalent among the CRF patients on dialysis having diabetes mellitus. Xerosis was present in 21 patients (41.17%) and pallor in 6 patients (30%). Pigmentation and sparse hair were present in 6 patients (35.29%) and 10 patients (58.82%) patients respectively. Macroglossia was seen in 59.09% patients having DM. Oral candidiasis was seen in 3(75%) patients (As shown in Table 6).

In the present study, acquired perforating dermatoses (20%), pruritis (22.22%) half and half nails (13.33%) were more prevalent among CRF patients on dialysis having hypertension. Xerosis was present in 13 patients (25.49%) and pallor in 6 patients (30%). Pigmentation and sparse hair were present in 6 patients (17.64%) and 2 patients (11.76%) patients respectively. Macroglossia was seen in 13.63% patients having DM (As shown in Table 6).

## 5. Discussion

We compared the results of our study with similar reports published earlier. In the present study, all 93, (100%) patients had one or the other cutaneous manifestations.

In the present study of 93 patients undergoing dialysis, major number of subjects i.e., 25 were in the age group of 41-50 (26.88%) followed by 24 patients (25.81%) in the age group of 61-70. In studies of Udaykumar *et al.*,<sup>1</sup> and Thomas EA<sup>3</sup> *et al.*, the maximum number of patients was from the age group of 41-50 and 40-60 respectively. In the study by Sorour N *et al.*,<sup>4</sup> maximum patients were in the age group of 45-65.

In the study by Geetha Chanda *et al.*,<sup>5</sup> of the 100 study participants, 72 were males and 28 were females and the male to femal ratio was 2.5:1. In present study we observed male preponderance (1.45:1) which is congruent with the observations of Singh G *et al.*,<sup>6</sup> (1.73:1) and Sultan MM *et al.*,<sup>7</sup> (1.94:1).

The risk factor of CRF in the present study is diabetes mellitus (35.48%), compatible with work of Thomas EA *et al.*,<sup>3</sup> (42.42%) and Geetha Chanda *et al.*,<sup>5</sup>. But in studies of Hajheydari Z *et al.*,<sup>8</sup> (29.7%) and Sultan MM *et al.*,<sup>8</sup> (60%) and Sorour N *et al.*,<sup>4</sup> the most common etiology was found hypertension.

In our study, 19.35% patients presented with pruritis and similar observations were made by Falodun O *et al.*,<sup>2</sup> (26.7%). In the study by Geetha Chanda *et al.*,<sup>5</sup> pruritis was found in 38 patients. In the study by Sorour N *et al.*,<sup>4</sup> 52 patients had pruritis.

In the present study, 54.8% patients suffered from xerosis. Similar observations were made by Falodun O *et al.*,<sup>2</sup> (60%) and Thomas EA *et al.*,<sup>3</sup> (66.7%). Singh G *et al.*,<sup>6</sup> (90%) and Udaykumar *et al.*, (79%) also observed the high prevalence of xerosis.

In the study of Geetha chanda *et al.*,<sup>5</sup> Xerosis was the most common non-specific manifestation observed in 59 (59%) patients. In the study by Sorour N *et al.*,<sup>4</sup> The most common skin manifestation was xerosis (72%).

The hyperpigmentation in the present study is seen in 18.3%; whereas Singh G *et al.*,<sup>6</sup> (36.6%), Udaykumar *et al.*,<sup>1</sup> (43%), Kolla PK *et al.*,<sup>10</sup> (39.4%) observed high

prevalence of hyperpigmentation in their studies. In the study by Geetha chanda *et al.*,<sup>5</sup> pigmentation was found in 32 patients. In the study by Sorour N *et al.*,<sup>4</sup> hyperpigmentation was seen in 44% of patients.

We observed less number of patients suffering from hyperpigmentation as compared to the above mentioned studies except the study of Falodun *et al.*,<sup>9</sup> in which authors noted less prevalence of hyperpigmentation i.e., 9.2%. Hyperpigmentation in dark individual is less perceptible unless it is extensive and this might be the reason of our above mentioned findings.

In present study, pallor of the skin was evident in only 21.5% patients which is quite low compared to studies of Udaykumar *et al.*,<sup>1</sup> (60%), and Sultan MM *et al.*,<sup>2</sup> (45%); whereas Falodun O *et al.*,<sup>9</sup> noted pallor in only 3.9%.

The reason for such variation may be due to subtle nature of pallor in dark colored patients. In the study by Geetha Chanda *et al.*,<sup>5</sup> pallor was the second most common finding constituting 57% of the patients.

In 5.4% patients acquired perforating dermatoses were seen which is in accordance with study of Kolla PK *et al.*,<sup>10</sup> (6.9%), however less in comparison to the studies done by Udaykumar *et al.*,<sup>6</sup> (21%), Sultan MM *et al.*,<sup>2</sup> (10%) and Thomas EA *et al.*,<sup>3</sup> (17.17%). In the study by Sorour N *et al.*,<sup>4</sup> Kyrles disease was seen in 7% of patients.

In present study purpura seen in 9.7% of patients which is in accordance with studies of Udaykumar *et al.*,<sup>1</sup> (9%) and Thomas EA *et al.*,<sup>3</sup> (10%). In the study of Sultan MM *et al.*,<sup>2</sup> purpura seen in more number of patients (19%) compared to present study. In the study by Geetha chanda *et al.*,<sup>5</sup> Purpura was observed in 4 (8%) patients in the dialytic group. In the study by Sorour N *et al.*,<sup>4</sup> purpura was seen in 2% of patients.

In 31% patients nails were normal. Half and half nail observed in 16.13% patients which is in congruent with study of Singh G *et al.*,<sup>6</sup> (13.3%), Udaykumar *et al.*,<sup>1</sup> (21%) and Sultan MM *et al.*,<sup>2</sup> (28%). Koilonychia (39.78%) is the most common nail change, which is high compared to study of Thomas EA *et al.*,<sup>3</sup> (5%). In the study by Sorour N *et al.*,<sup>4</sup> nail changes were seen in 61% of patients. Clubbing was seen in 8.6% of patients and onychorrhexis in 6.45%. Nail changes seen in present study among dialysis group is similar to the studies of Udaykumar *et al.*,<sup>1</sup> and Sultan MM *et al.*,<sup>2</sup>. In the study by Geetha Chanda *et al.*,<sup>5</sup> Out of the 100 patients, 46% had nail changes.

Among the dialysis group, observed hair changes included less scalp hairs and lustreless hairs in 17 (18.28%) and 11 patients (11.83%) respectively. In 65 patients (69.89%) hairs were normal. Udaykumar P *et al.*,<sup>1</sup> found sparse hair over body and scalp in 30%, 11% and in 16% of patients lustreless hairs in their study. Sultan MM *et al.*,<sup>2</sup> noted lustreless hair (47%), sparse scalp (46%) and

body hair (27%). In the study by Geetha chanda *et al.*,<sup>5</sup> hair changes were noted in 16 patients in dialytic group 10 (62.5%), whereas in nondialytics, it was 6 patients (37.5%). In the study by Sorour N *et al.*,<sup>4</sup> hair changes was seen in 48% of patients. Present study is in congruence with study of Udaykumar P *et al.*,<sup>1</sup>. Hair changes are less compared to Sultan MM *et al.* study<sup>2</sup>.

In the study by Geetha chanda *et al.*,<sup>5</sup> mucosal changes were noticed in 11 patients, of which the dialytic group consisted of 8 (16%) patients and nondialytic group 3 (4%). In our patients from dialysis group, 52(55.91%) patients' oral cavity was normal. Macroglossia was seen in 22 patients (23.65%) and coated tongue in 10 (10.75%).

In present study out of 93 patients on dialysis, 06 patients (6.5%) had pyodermas ranging from recurrent folliculitis to cellulitis, 04 (4.3) patients had intertrigo, 03 patients (3.2%) had had herpes simplex virus infection, 03 patients (3.2%) had pityriasis versicolor infections, and 02 patients (2.2%) had tinea cruris and corporis infections.

In the present study incidence of infection was (19.4%) which is comparatively low in comparison to the studies of Udaykumar P *et al.*,<sup>1</sup> (55%), Sultan MM *et al.*,<sup>2</sup> (40%) and Kolla PK *et al.*,<sup>10</sup> (53%). Early referral may have played role in decreased incidence of infection in our study.

In the study by Sorour N *et al.*,<sup>4</sup> maximum patient had bacterial infections.

### Specific lesions absent in present study

- Bullous dermatoses of kidney disease were not observed in this study however Khanna D *et al.*, found it in 2% of their study population<sup>11</sup>.
- Uremic frost (3%) was found in the study of Udaykumar *et al.*,<sup>1</sup>. We did not find uremic frost in our study may be due to early consultation by the patients and the prompt dialysis therapy, which may have arrested this cutaneous manifestation, which is a terminal finding in uremia.
- Panniculitis and calcification were absent in present study, however calciphylaxis (2%) were seen in study of Sultan MM *et al.*,<sup>2</sup>

### Comorbidities Associated

No specific study had drawn comparison between the dermatologic findings seen in chronic renal failure patients receiving hemodialysis and the related co-morbidities. We found out that

- Oral candidiasis and other infections were most commonly noted in diabetes mellitus patients.
- Acquired perforating dermatosis was also most commonly observed in diabetes mellitus patients.
- Hypertention was second most common cause of CRF
- Purpura was most commonly seen in pyelonephritis.

However, no specific relation could be drawn between co-morbidities and cutaneous manifestations.

## 6. Conclusion

A total of 93 patients of CRF on hemodialysis were enrolled in the study. The study was conducted in a tertiary health care centre over a period of two years.

This clinical study revealed the following

- All the patients with chronic renal failure who were receiving hemodialysis had atleast one dermatologic manifestation.
- Diabetes mellitus (35.48%) was the most common cause of chronic renal failure, followed by hypertension (29.03%).
- Xerosis (54.8%) was the most common dermatological manifestation seen, followed by pallor (21.5%) and the pruritis (19.35%).
- Acquired perforating dermatosis (5.4%) and calcinosis cutis (3.2%) were specific manifestations seen.
- Skin changes due to treatment i.e., arteriovenous fistula were arteriovenous shunt abscess and aneurysm, and hypertrophic scar.
- The most common infections seen were bacterial infections (6.5%), followed by fungal infections of pityriasis versicolor (3.2%).
- Koilonychia (39.78%) was the most common nail finding among the specific nail changes of chronicrenal failure patients followed by half and half nail (16.13%).
- Sparse hair was seen in 18.28% followed by luster less hair in 11.83% patients.
- Macroglossia was seen most commonly (23.65%) followed by coated tongue (10.75%).
- Eighty percent of acquired perforating dermatosis was seen in diabetes mellitus patients and rest in hypertensive patients.
- Oral candidiasis was most commonly seen in diabetes mellitus patients.

As there is wider availability of haemodialysis centers and improvement in haemodialysis machines, patients with CRF are experiencing loner survival and thus exhibiting cutaneous complications of CRF and haemodialysis. Sometimes, dermatologist is the first doctor to whom the patient consults with these cutaneous manifestations even before being diagnosed as CRF. Hence a dermatologist should thoroughly

do clinical examination and keep in mind chronic renal failure while examining patient with specific manifestations.

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