

## A clinical study of cutaneous manifestations in patients with chronic kidney disease

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### Abstract:

**Background:** Skin is often considered as a mirror of internal diseases. Many systemic diseases produce cutaneous manifestations before or after the onset of systemic events. Patients with Chronic Kidney Disease (CKD) are often burdened by skin lesions, these findings can prompt for early diagnosis of CKD and its management.

**Material & Methods:** A total of 150 cases of CKD with or without hemodialysis were studied for a period of 18 months. Detailed cutaneous examination was done and dermatological manifestations were evaluated and compared among dialysis and pre-dialysis groups.

**Results:** 97 patients were in Dialysis group and 53 in Pre-dialysis group. Xerosis(62%) was most common followed by pallor(31.3%), pruritus (28%), pigmentation (25%), infections (13.3%), purpura & ecchymoses(12.7%), absent lunula(11%), xerostomia (11%), eczema(9.3%), leukonychia (8%), perforating disorders(7.3%), half & half nails (7%). Bullous disorders and nephrogenic systemic fibrosis were encountered less often. The frequency of most of the cutaneous manifestations was similar between dialysed and undialysed patients. Xerosis, pigmentation, and pruritus were more frequent in patients on dialysis and mean duration of kidney disease was significantly higher for patients with pigmentation, pruritus, perforating dermatoses and half-and-half nail.

**Conclusions:** Dialysis and transplantations have prolonged the survival and thus distressing cutaneous complications of CKD and hemodialysis. Recognition and management of some of these dermatological manifestations may vastly reduce the morbidity and improve quality of life in these patients.

**Keywords:** Chronic kidney disease, Dialysis, Predialysis, Pruritus, Xerosis

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### I. Introduction

Chronic Kidney Disease (CKD) is a progressive loss of kidney function over a period of months or years through five stages. All individuals with either kidney damage with irreversible reduction in number of nephrons or a Glomerular Filtration Rate(GFR) of  $<60\text{ml}/\text{min}/1.73\text{m}^2$  for three months are classified as having Chronic Renal Failure (CRF) corresponds to CKD stages 3-5 and end stage renal disease(CKD stage-5).

The effects of chronic kidney disease are complex as it causes dysfunction of multiple organs. It has been found that 50-100% of patients with ESRD have at least one associated cutaneous change. Patients with ESRD are initially managed with conservative therapy. Eventually, however they may require hemodialysis. The dermatological findings can precede or follow the initiation of hemodialysis treatment and there are more chances to develop newer skin changes with increase in life expectancy with the treatment. The patients of CRF are more susceptible to infections due to impaired cellular and humoral immunity. Wound healing is also delayed in CRF patients and they are more susceptible to pressure sores. The skin manifestations tend to alter and are aggravated relatively quickly when chronic renal insufficiency leads to compulsory dialysis treatment. The frequency of malignant skin tumours is increased during dialysis.

By taking all the above issues into consideration the present study of cutaneous manifestations in patients with chronic kidney disease has been undertaken to analyse the current scenario in patients attending our Dermatology Venereology & leprosy (DVL) Outpatient department(OPD) or referred from nephrology and dialysis units of Government General Hospital, Guntur from January 2013 to June 2014.

## **II. Aims and Objectives**

- 1) To study the various cutaneous manifestations and their prevalence in patients with Chronic Kidney Disease.
- 2) To study the age and sex incidence of the chronic kidney disease patients with cutaneous manifestations.
- 3) To study the occurrence of dermatological manifestations of chronic renal failure in patients on hemodialysis.
- 4) To compare cutaneous manifestations in CKD both on dialysis and pre-dialysis groups.

## **III. Materials and Methods**

**Study design :**Prospective hospital based study

**Studyperiod :**The present study is conducted over a period of 18 months from January 2013 to June 2014

**Study place :**Department of Dermatology, Venereology & Leprosy and Nephrology at Government General Hospital / Guntur Medical College, Guntur

### **Inclusion criteria:**

- The study was conducted on 150 patients who were diagnosed to have chronic kidney disease who presented with cutaneous lesions and symptoms
- The patients in this study included both admitted patients in department of nephrology and those attending nephrology OPD and patients referred to dermatology OPD
- Patients on haemodialysis at dialysis unit of nephrology department who presented with cutaneous lesions and symptoms.

### **Exclusion criteria:**

- Patients who have undergone peritoneal dialysis.
- Patients who underwent renal transplantation.

### **Methodology:**

After obtaining clearance and approval from the institutional ethical committee, 150 cases were included for the study. Informed and written consent was taken from patients and the clinical data was recorded as per the proforma. A detailed history was taken with particular reference to the duration, initial site of appearance of lesion, extension of lesions and symptoms, duration of renal disease and duration of symptoms, duration of skin ailment, duration of dialysis, onset of changes with relation to renal disease and dialysis. History of underlying systemic conditions like diabetes mellitus, hypertension, tuberculosis, connective tissue disorder etc was obtained. Clinical photographs were taken at the same sitting.

The skin, hair, nails and mucosa were examined in detail for –

1. Specific lesions of chronic kidney disease
2. Presence of cutaneous infection
3. Associated skin lesions

All the patients were thoroughly investigated with routine haematological and biochemical investigations. Wherever required radiographs and ultrasonography were done. All these patients were managed with drugs and dialysis according to severity of CKD. The severity of chronic kidney disease was graded into stage 1-5 based on eGFR(Cockcroft-Gault equation).

Mild(stage 1, 2), Moderate (stage 3), Severe (stage 4-5)

### **Routine and relevant blood investigations were done for all patients:**

1. Hemoglobin, total WBC count & differential count, plasma glucose.
2. Blood urea, Serum creatinine, Serum electrolytes, Serum calcium, phosphorus, thyroid, parathyroid hormone level, ACTH levels.
3. HIV 1 & 2, HBsAg, HCV. 4. Complete urine analysis. 5. Chest X-ray, ECG,
4. Special investigations including Tzanck smear, wet mount preparations from scraping and microscopy, nail clippings and skin scrapings for 10% KOH, fungal culture, skin biopsy for histopathology, pus for culture and sensitivity whenever required were done.

## **IV. Results**

A total of 150 cases were recruited. All CKD patients with cutaneous manifestations of both sex and all age groups were examined for cutaneous manifestations. In some patients there was more than one type of cutaneous manifestations.

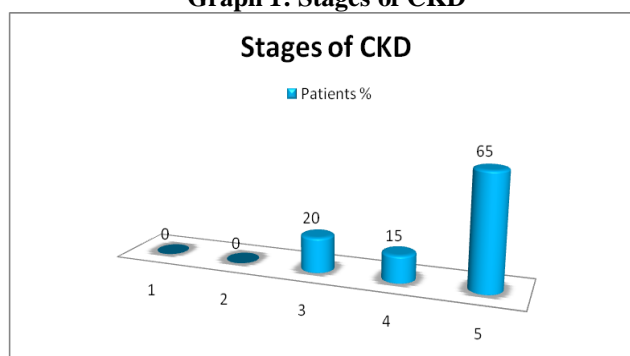
Out of 150 patients 97 patients were in Dialysis group and 53 in Pre-dialysis group (Table-1).

**Table 1:No.of patients on Dialysis &Predialysis**

CKD Patients	No. of Patients	Percentage
On Dialysis	97	65
Pre-Dialysis	53	35
Total	150	100

Patients who are not undergoing dialysis i.e., CKD stages 3&4 and patients who are undergoing dialysis i.e., CKD stage -5, were included in the study. Most of our patients were in stage 5 (65%) of CKD(Graph-1).

**Graph 1: Stages of CKD**



**4.1. Sex distribution:** Males were affected more than females by CKD and its cutaneous manifestations (Table-2)

**Table 2: Sex distribution**

CKD Patients	Male	Female	Grand Total
<b>Dialysis</b>	75(77%)	22(23%)	97(100%)
<b>Predialysis</b>	39(74%)	14(26%)	53(100%)

In the present study most of the patients hail from rural area 85(56.7%) than urban area 65(43.3%). Similarly most of the patients in dialysis and pre dialysis group belong to rural area.

**4.2. Age wise distribution:**

In the present study, age group of patients ranged from 4 to 87 years. Majority of patients belonged to age group of 60-69 years(25%) closely followed by 50-59 years (24%) and 40-49 years (22%). Patients in the age group 10-19 years (0%) were least effected age group. The mean age found to be 52.2 years.

Out of 97 dialysis group, majority of patients (26%) each were in the age groups of 40-49 and 50-59 years followed by 60-69 years with 20% of patients. In pre dialysis (non dialysis) group, out of 53 patients, 18 patients (34%)were present in the age group of 60-69 , followed by 21%(11) in 50-59 years and 15%(8) in 40-49 years age groups.

**Table 3 : Agewise distribution of CKD patients**

Age In Years	No of patients	Percentage	Dialysis	%	Pre-Dialysis	%
< 10 Years	1	1%	0	0%	1	2%
10 - 19 Years	0	0%	0	0%	0	0%
20 - 29 Years	9	3%	7	7%	2	4%
30 - 39 Years	21	14%	15	15%	6	11%
40- 49 Years	33	22%	25	26%	8	15%
50 - 59 Years	36	24%	25	26%	11	21%
60-69 Years	37	25%	19	20%	18	34%
70-79 Years	10	7%	5	5%	5	9%
80-89 years	3	2%	1	1%	2	4%
<b>Total</b>	<b>150</b>	<b>100%</b>	<b>97</b>	<b>100</b>	<b>53</b>	<b>100%</b>

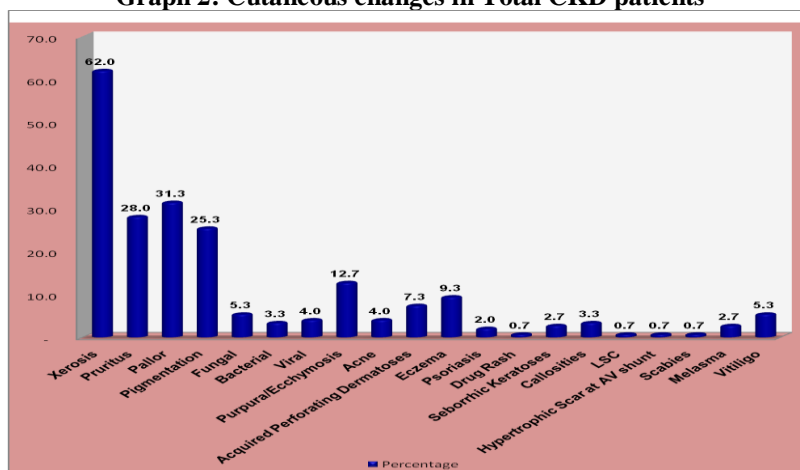
**4.3. Causes and duration of CKD:** The cause of CKD in majority of patients was hypertension (39.3%). Patients with hypertension as cause of CKD were 28.3% in pre dialysis group and 45.4% in dialysis group. Diabetes mellitus was the next common cause (30.7%). The duration of CKD varied from 1to less than 5 years in most of patients 55%. In dialysis patients 63% had duration between 1to <5 years and in pre dialysis patients 40% patients had same duration of disease.(Table-4)

**Table 4: Duration of CKD**

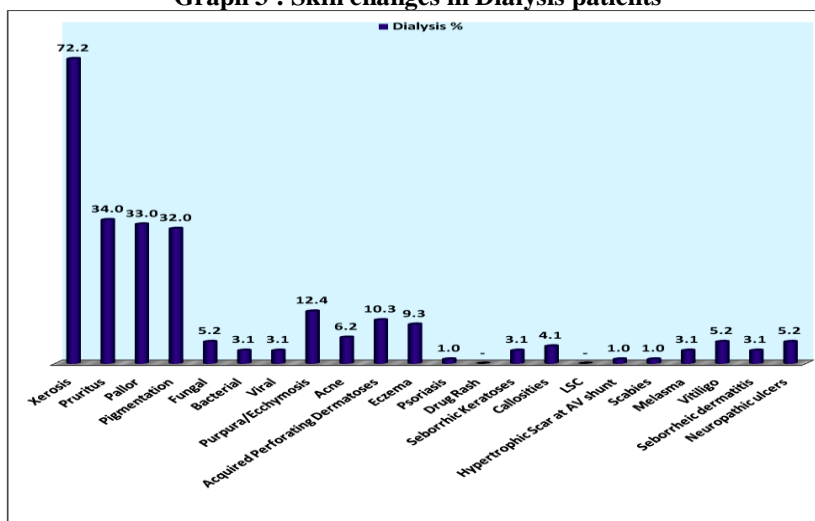
Duration of CKD	No. of Patients	Percentage	Dialysis	%	Pre-Dialysis	%
< 6 Months	34	23%	15	15%	19	36%
6 m to <1 Yrs	4	3%	4	4%	0	0%
1 - <5 Yrs	82	55%	61	63%	21	40%
5 to <10 Yrs	17	11%	14	14%	3	6%
10 Yrs&Above	2	1%	2	2%	0	0%
Unknown	11	7%	1	1%	10	19%
<b>Total</b>	<b>150</b>	<b>100%</b>	<b>97</b>	<b>100%</b>	<b>53</b>	<b>100%</b>

Xerosis is the most common cutaneous change in total CKD patients (62%) as well as in dialysis (72.2%) and pre dialysis (43.4%) group. Pruritus was 2<sup>nd</sup> most common 34% in dialysis patients, 28% in total CKD patients, while 17% in pre dialysis patients.(Graph 2,3&4). Pallor (20%) is 2<sup>nd</sup> most common in total CKD patients and also in pre- dialysis group (28.3%), where as 3<sup>rd</sup> most common in dialysis group. Pigmentation is the 4<sup>th</sup> most common finding in total CKD patients (25.3%) and dialysis (32%) where as it is less common in pre dialysis group.

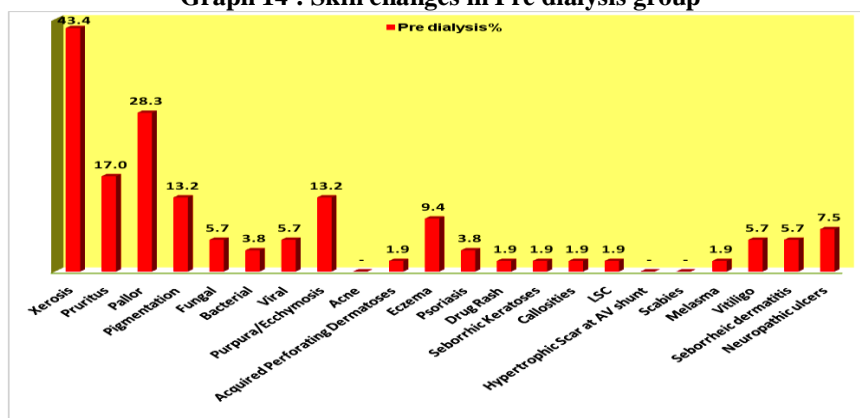
**Graph 2: Cutaneous changes in Total CKD patients**



**Graph 3 : Skin changes in Dialysis patients**



Graph 14 : Skin changes in Pre dialysis group



Cutaneous infections were seen in 13.3% of patients. Fungal (5.3%) and viral(4%) infections were more common followed by bacterial (3.3%) and parasitic infestations (1%)(Graphs: 2,3,4).

**Hair and nail changes:**

Nail change seen in 54% of CKD patients in present study. Absent lunula(11%) was the commonest in both total CKD and dialysis patients. Followed by sub-ungual hyperkeratosis(10%), leukonychia(8%), dystrophic nails(7%), koilonychia(7%) and half & half nails(7%) (Fig:1). Leuconychia(8%),Dytrophic nails(7%), melanonychia half and half nails(7%) are exclusively more common in dialysis group.

Only 45% of the patients had hair changes. The most common hair change was sparse scalp hair (41%) followed by lusterless hair (24%). Sparse hair and lusterless hair were more common in dialysis group.

**4.4. Oral changes :**

Majority of patients (56%) did not have any oral changes. Pallor was present in 28% and xerostomia was seen in 11% of patients. Macroglossia was seen in 9 patients (6%)

**4.5. Cutaneous changes in relation to duration of CKD :** Pallor(13%) and pigmentation (13%) were more common in patients with CKD of less than 6 months. Xerosis is the commonest 12% in patients with CKD of duration less than 6 months to 1 year. Half & half nails(70%) were most common finding in patients with CKD of 1 to less than 5 years. Pruritus is the most common symptom in patients with CKD of 1 to less than 5 years, followed by pallor(66%) and pigmentation(63%). Acquired perforating disorders are most commonly found in patients with CKD of 5 years to less than 10Years of duration, followed by Half & half nails(30%). Pigmentation 3% and Xerosis (2%) are common finding in patients with CKD of 10 years and above

Table 5: Cutaneous changes in relation to duration of CKD

Duration of CKD	Xerosis	Pallor	Pruritus	Pigmentation	APD	Half and half nails	Sparse hair
< 6 months	9(10%)	6(13%)	2(5%)	5(13%)	0(0%)	0(0%)	0(0%)
6 months to <1 year	11(12%)	2(4%)	4(10%)	0(0%)	0(0%)	0(0%)	0(0%)
1 - <5 year	52(56%)	31(66%)	28(67%)	24(63%)	7(64%)	7(70%)	7(11%)
5 years to <10 years	11(12%)	7(15%)	7(17%)	7(18%)	4(36%)	3(30%)	3(5%)
10 years & above	2(2%)	0(0%)	1(2%)	1(3%)	0(0%)	0(0%)	0(0%)

**4.6. Coexistent viral infections:** Coexistent viral infection present in CKD were HCV (13.3%) ,HbsAg(5%) and HIV(2%) .

**4.7. Miscellaneous** Endogenous eczema 9% followed by neuropathic ulcers(6%) and vitiligo (5.3%) are the miscellaneous findings associated with CKD. In the present study majority of patients(50%) had moderate anemia. In Dialysis group 58% of patients had moderate anemia followed by severe anemia in 26% of patients. In predialysis group most of the patients had mild anemia(45%).

## V. Discussion

In the present study a total of 150 diagnosed cases of Chronic kidney disease with cutaneous manifestations attending the departments of Dermatology Venerology and Leprosy , nephrology and dialysis centre at Govt. General Hospital, Guntur were studied in detail.

The results obtained in the present study were compared with previously conducted similar studies In studies of Khanna D et al, Falodun et al<sup>7</sup>, Thomas EA et al<sup>9</sup>, number of patients in dialysis group were 100, 76 and 70 respectively, whereas in present study the number of patients in dialysis group were 97. In the present study the number of patients in pre-dialysis group were 53, it was more when compared to studies of Falodun O et al(44) and Thomas EA et al (25) but less than Khanna et al(100).

The mean age of CKD patients in the present study 52.2 years which is comparable to Thomas EA et al (50.5) study, Hajheydari et al study (50.0)<sup>8</sup> and Reema mirza et al (50.58)<sup>4</sup> where as mean age was less in studies of PK Kolla et al<sup>10</sup>(43.8), Falodun et al (43.12), Khanna D et al<sup>11</sup> (40.2) and Udaya kumar et al<sup>12</sup> (43).

In the present study majority of patients (25%) belonged to the age group of 60 -69 years, followed closely by 50 – 59 years (24%) and 40-49 years (22%). The results are very near to that of Reema Mira et al and Thomas EA et al, the majority of patients belonged to age group of 6<sup>th</sup> decade. The reasons of more patients in age group 60-69 years might be as the chronic diseases like hypertension and diabetes are more common in these age group.

In the present study most of the patients hail from rural area 85(56.7%) than urban area 65(43.3%). Similarly most of the patients in dialysis and pre dialysis group also belong to rural area. The reason might be as the present study was conducted at a tertiary referral hospital, most of the patients are referred from surrounding rural areas as the hospital has separate dialysis unit where dialysis were being done at free of cost. As most of the patients were from low socio-economic status and hail from rural area with low literacy, most of patients preferred government hospital for treatment.

In present study males preponderance is seen which is consistent with the study groups of Singh et al<sup>10</sup>, Udaya Kumar e al , Thomas EA et al, PK Kolla et al and Sultan MM et al<sup>13</sup>. The reasons may be the incidence of Hypertension and Diabetes mellitus are more in male population compared to females. Health seeking behavior and self reporting are more in male population as they are the earning members of the family.

The etiology of CKD in present study is Hypertension which is consistent with studies of PK Kolla et al (2013)<sup>10</sup>, Reema Mirza et al(2012)<sup>4</sup>, Sultan MM et al (2009)<sup>13</sup> and Hajheydari et al study(2008)<sup>8</sup>. It is different from Thomas et al (2012)<sup>9</sup> and Khanna D et al(2010)<sup>11</sup> where the most common causes are Diabetes mellitus and Chronic glomerulonephritis respectively. Even though recent studies showed that diabetic nephropathy is the most common etiology for CKD, in our study it is the 2<sup>nd</sup> most common etiology. As variation can be encountered in prevalence of diabetes depending upon the rural/urban divide, level of economic development, and genetic background of the population studied<sup>14</sup>.

The number of patients having pruritus (28%) in the present study is similar to the study of Falodun O et al (26.7%). In studies of Singh G et al<sup>4</sup>, Udaykumar et al<sup>4</sup>, Hajheydari Z et al (2008)<sup>11</sup>, Khanna D et al(2010)<sup>13</sup>, Thomas EA et al (2012)<sup>14</sup>, Lupi O, Rezende L et al<sup>81</sup> the number of patients having pruritus was more when compared to present study 46.7%, 53%, 38.6%, 36%, 43.4%, 56.6% and 53% respectively. The possible reason for this variation may be difference in individual tolerance and threshold for itch due to racial and ethnic background. Moreover the assessment of itch is also subjective based on perception<sup>87</sup> and pruritus is found to be more severe in diabetic patients who are less in the present study compared to other studies<sup>10</sup>.

In present study the number of patients having pruritus was more in dialysis group 33 (34%) compared to pre dialysis group 9(17%). Similar figures were seen in Thomas et al , Khanna D et al and Falodun et al studies which indicate that dialysis may not subside pruritus<sup>6</sup>. Hemodialysis has been the initiating factor of pruritus in some patients , in some it improved the pruritus. Many of the patients with pruritus have concomitant xerosis , Morton et al also showed lower hydration of stratum corneum in uraemic patients with pruritus<sup>83</sup>.

Pruritus in CKD patients may be due to slowly accumulated or deposited pruritogens, associated with the degree of renal insufficiency (urine output of <500 ml), secondary hyperparathyroidism, xerosis, increased serum levels of magnesium, calcium, aluminium, phosphate and histamine, uremic sensory neuropathy, abnormal fatty acid metabolism, hypervitaminosis A and iron deficiency anaemia<sup>10,19</sup>. The increased serum histamine level seen in CRF patients on hemodialysis is due to allergic sensitization to various dialyzer membrane components and impaired renal excretion of histamine.<sup>10</sup>

In present study 62% patients are having xerosis which is close to the studies of Falodun O et al<sup>10</sup> (60%) and Thomas EA et al (66.7%). In a similar study by Khanna D et al the number of patients(145)(72%) with xerosis was more. In studies of Singh G et al<sup>4</sup> (90%) and Udaykumar et al (79%) xerosis is more compared to present study. In present study xerosis patients having diabetes mellitus were less and hence the less percentage of xerosis compared to above mentioned studies.

Lupi O, Rezenda L et al<sup>81</sup> had reported xerosis in 50 to 85% of patients with CRF. The findings are comparable to our present study. Tawade et al<sup>82</sup> reported an incidence of 46% xerosis in patients with CRF. Morton et al (1996)<sup>83</sup> reported a prevalence of 46-90%.

Xerosis was the first most common finding in the present study documented in 62% of the patients. It is the most common finding in dialysis patients also (72.2%) when compared to predialysis group. This can be attributed to reduction in the size of eccrine sweat glands, high diuretic dose regimens and hypervitaminosis A seen in dialysis patients<sup>10</sup>. Xerosis was found to be worsened in some patients, improved in few and unchanged in a lot of patients on hemodialysis.

In present study pallor is the 2<sup>nd</sup> predominant finding noted in 47 patients 31.3% which is less compared to studies of Udaykumar et al<sup>6</sup>(60%), Sultan MM et al<sup>8</sup>(45%) and Thomas EA et al<sup>12</sup> (45.45%). In studies of Falodun O et al<sup>10</sup> pallor was seen in only 2.5% which is less compared to present study.

Even in dialysis group, pallor (33%) is less compared to above mentioned studies except in study of Falodun et al which is only 3.9%. The cause of anemia may be decreased erythropoietin production by the diseased kidney or malnutrition or anemia of chronic disease. The less prevalence of pallor (anemia) in the present study compared to previous studies may be due to most of the patients were on Erythropoietin.

The pigmentation in the present study is the 4<sup>th</sup> most common manifestation seen in 25.3% which is less compared to studies of Singh G et al,(36.6%), Udaykumar et al (43%), Kolla PK et al(39.4%), Thomas EA et al<sup>14</sup> (32.3%) and Khanna D et al (50.5%). Thomas EA et al<sup>14</sup> had reported hyperpigmentation in 32.3% of patients with CRF. This results are comparable to our study 32% in Dialysis group of our study.

Even in dialysis group, the percentage of patients having pigmentation (32%) is less compared to above mentioned studies except in the study of Falodun et al<sup>10</sup> which is 9.2% and is borderline with Singh et al study 36.6%. This might be due to difficulty in appreciating hyper pigmentation in dark coloured individuals, unless it is extensive. As most of the patients in present study are hailed from rural area and occupationally farmers have heavy sun exposure, which also makes difficult to differentiate from occupational/ photomelanosis and kidney disease induced. The diffuse brownish-black hyperpigmentation on sunexposed areas can be attributed to retention of chromogens and deposition of melanin in the basal layer and superficial dermis due to failure of the kidneys to excrete beta-Melanocyte Stimulating Hormone ( $\beta$ -MSH)<sup>9,10</sup>.

Acquired perforating dermatoses are seen in 7.3% patients and in 10.3%(in dialysis group) which is in accordance with study of Sultan MM et al<sup>8</sup>(10%) and is less compared to the studies of Udaykumar et al<sup>6</sup>(21%), and Thomas EA et al (17.17%) but more when compared to Kolla PK et al<sup>10</sup> (6.9%). As APD are significantly more prevalent in diabetic patients<sup>10,11</sup> and in the present study the number of patients with diabetes mellitus are less.

However the percentage of patients having acquired perforating disorder in the present study is in par with the literature<sup>78</sup>, i.e., 10-17%<sup>10</sup>. Six of eleven patients with perforating disorders had moderate to severe pruritus as an associated complaint not localised to the site of lesion, a finding also observed by Morton et al. It has been postulated that micro trauma from scratching may lead to dermal necrosis due to poor blood supply and extrusion of necrotic material through the epidermis<sup>84</sup>.

In present study majority of patients (11%) had absent lunula, followed by subungual hyperkeratosis (10%), leukonychia (8%), dystrophic nails (7%), koilonychia (7%) and half & half nails (7%). Onychomycosis and splinter haemorrhages were least present in 1% each. 69 patients (46%) did not have any nail changes. Nail changes are seen in 81 patients i.e., 54% which is comparable to Udaykumar et al (48%). The nail changes in dialysis group(60.82%) were comparable to Khanna D et al (64%), Reema Mirza et al (61.6%) and Deshmukh et al (60%)<sup>16</sup>.

In our study the most common nail finding was absent lunula which is in accordance to Khanna D et al<sup>13</sup>. But the prevalence is less when compared to Khanna D et al, Half and half nail is seen in 7% patients of total CKD and 8.2% in dialysis group which is in accordance with study of Singh G et al (13.3%). Koilonychia (7%) is comparable to study of Thomas EA et al<sup>12</sup> (5%).

In dialysis group, 59 patients had nail changes i.e., 60.8% which is comparable to studies of Reema mirza et al, Deshmukh et al<sup>16</sup> (60%), 15 patients (15.5%) had absent lunula, Leuconychia (11.3%), Dystrophic nails (11.3%) half and half nail (8.2%). Thirty eight (39.2%) patients did not have any nail changes. Onychomycosis constituted 2% of patients which is less compared to other studies Thomas EA et al<sup>14</sup> (7%), Udaykumar et al<sup>10</sup>

Absent lunula, may be attributed to anemia or poor general condition of these patients. The causes for half & half nails might be deposition of melanin in the nail plate due to stimulation of matrix melanocyte, increase in capillaries and thickening of their walls and proximal half of nail appears white because of edema.

Leuconychia is commonly seen in patients with dialysis patients and it may be related to high prevalence of pallor in chronic kidney disease patients.

Greater frequency of trauma and higher incidence of onychodystrophy in toenails makes the discoloration and demarcation of half-and-half nail less evident. These might be one of the reasons for less number of half and half nails in our present study when compare to others.

In majority of patients hairs were normal (55%). Hair changes were seen in 45% of patients. The hair changes were more in dialysis group (64%) when compared to pre dialysis group (30%). Sixty two patients had sparse hair on scalp and body (41%) and lusterless hair in 24 patients 16%.

The numbers of patients having hair changes were more in present study compared to that of Falodun et al<sup>79</sup> (2.5%). The reason for this may be due to associated anemia in the present group.

Among dialysis group, changes like sparse scalp hairs and lustreless hairs were present in 48(49%) and 17(18%) patients respectively. Hairs were normal in 45 patients (46%). Total percentage of patients with hair changes are 53.6% in dialysis group which is comparable to Reema mirza et al<sup>4</sup> (56.6%). In study of Sultan M M et al<sup>12</sup> reported brittle and lustreless hair in (47%), sparse scalp hair (46%) and sparse body hair (27%) comparable to present study.

In pre dialysis patients, majority had no hair changes (70%), sparse hair (26%) and lusterless hair in 13% of patients.

Alopecia probably is more common in patients with ESRD. The cause of alopecia in ESRD includes SLE, chronic telogen effluvium due to heparin in hemodialysed patients<sup>85</sup> and concomitant anemia and malnutrition in these patients. Sparse body hair and diffuse alopecia with lusterless hair have been attributed to decreased secretion of sebum.

In present study majority of patients (56%) did not have any oral changes. Among dialysis group, 52 patients (54%) did not have any oral changes. Pallor was seen in 28 patients (29%) and xerostomia in 15(1%). Macroglossia was seen in 9 patients 9% . In pre dialysis group, 32 patients (60%) did not have any oral changes and pallor was seen in 14 patients (267%).

Thomas et al<sup>14</sup> had macroglossia in 9.09% which is similar to present study. Sultan M M, Udaykumar et al in their study reported the prevalence of macroglossia to be 42% and 35% respectively which are comparatively more than present study dialysis group(9%).

Xerostomia was reported to be 15% in present study and reported to be 35% and 31% in Sultan M M and Udaykuamr et al<sup>10</sup> . It was attributed to mouth breathing and dehydration. Angular cheilitis was reported in present study to be 3%. It was reported to be 15% and 12% in Sultan M M and Udaykumar et al<sup>10</sup>

Infections are seen in 13.3 % patients in present study which is in accordance with study of Falodun O et al<sup>11</sup> (16.6%). In study of Thomas EA et al<sup>12</sup> infection is seen in 26.26% which is more compared to present study. The decrease incidence in present study may be due to early referral, early diagnosis and treatment. Among fungal infections Pityriasis versicolor was most common in present study as heat and humidity are more in this region.

Infections were more in dialysis group than in Predialysis group, this can be attributed to the impaired cellular and humoral immunity in patients undergoing dialysis making them more susceptible to infections<sup>85</sup>.

## **VI. Conclusion**

1. Prevalence of cutaneous manifestations is high, even in patients with chronic kidney disease that has not progressed to complete renal failure, and may act as markers of kidney disease in the absence of more alarming systemic findings.
2. Most of the specific cutaneous manifestations of chronic kidney disease were seen in this study. Most common among these manifestations is xerosis, which can be easily managed with the regular use of emollients and maintenance of vitamin A and D balance.
3. Cutaneous manifestations increase with deteriorating renal functions and are often more frequent in patients with longstanding kidney insufficiency.
4. The mean age of CKD patients in the present study 52.2 years. The majority of patients belonged to age group of 6<sup>th</sup> decade. The reasons of more patients in age group 60-69 years might be as the chronic diseases like hypertension and diabetes are more common in this age group.
5. Most of the patients in dialysis and pre dialysis group belong to rural area. The reason might be as the present study was conducted at a tertiary referral hospital, most of the patients are referred from surrounding rural areas as the hospital has separate dialysis unit where dialysis were being done at free of cost.
6. In present study males preponderance can be attributed to higher incidence of hypertension and Diabetes mellitus, health seeking behavior and self reporting in men.
7. Dialysis often accentuates the cutaneous signs and symptoms and may not be very successful in alleviating the cutaneous morbidity
8. In present study the number of patients having pruritus was more in dialysis group 33 (34%) compared to pre dialysis group 9(17%).



9. Hemodialysis has been the initiating factor of pruritus in some patients, in some it improved the pruritus. Many of the patients with pruritus have concomitant xerosis,
10. Pruritus in CKD patients may be due to slowly accumulated or deposited pruritogens, associated with the degree of renal insufficiency (urine output of <500 ml), secondary hyperparathyroidism, xerosis, increased serum levels of magnesium, calcium, aluminium, phosphate and histamine, uremic sensory neuropathy, abnormal fatty acid metabolism, hypervitaminosis A and iron deficiency anaemia<sup>10,19</sup>. The increased serum histamine level seen in CRF patients on hemodialysis is due to allergic sensitization to various dialyzer membrane components and impaired renal excretion of histamine.
11. Xerosis was the first most common finding in the present study documented in 62% of the patients. It is the most common finding in dialysis patients also (72.2%) when compared to predialysis group. This can be attributed to reduction in the size of eccrine sweat glands, high diuretic dose regimens and hypervitaminosis A seen in dialysis patients.
12. Hair and nail changes were found more in patients on dialysis.
13. Alopecia probably is more common in patients with ESRD. The cause of alopecia in ESRD includes SLE, chronic telogen effluvium due to heparin in hemodialysed patients and concomitant anemia and malnutrition in these patients.
14. Sparse body hair and diffuse alopecia with lusterless hair have been attributed to decreased secretion of sebum.
15. The decrease in incidence of skin infections in present study may be due to early referral, early diagnosis and treatment. Among fungal infections Pityriasis versicolor was most common in present study as heat and humidity are more in this region.
16. Infections were more in dialysis group than in Predialysis group, this can be attributed to the impaired cellular and humoral immunity in patients undergoing dialysis making them more susceptible to infections.
17. Skin changes due to treatment reported were hypertrophic scar at arterio-venous shunt, other than pruritus and pigmentary changes.
18. Cutaneous infections and infestations were seen in 13.3% of cases. Fungal and viral infections were most common followed by bacterial infestations.
19. Regular prophylactic use of emollients, sunscreens, and sun protection measures may go a long way in managing these distressing cutaneous complaints.
20. Timely nutritional supplementation and treatment of cutaneous infections is recommended.
21. With wider availability of haemodialysis centers even to the poorer section of society, patients with CRF are surviving longer and exhibiting cutaneous complications of CKD and haemodialysis.
22. Some of these changes may be missed if not specifically thought.
23. Sometimes, few patients with these cutaneous manifestations see dermatologist's consultation before being diagnosed as CKD. Hence a dermatologist should undertake a detailed clinical examination and refer the patient to nephrologists to rule out or diagnose CKD.
24. The dermatological manifestations may cause significant distress to the patients with CKD stage- 5 i.e., ESRD; hence these manifestations should be actively looked for in all CKD patients, as early diagnosis and management can reduce morbidity.
25. All the patients should also follow up regularly in dermatological department along with nephrology department.
26. This supports that skin is a complex organ and is mirror of internal disease as many systemic diseases including CKD can be diagnosed by their cutaneous manifestations.
27. Furthermore large-scale studies needed to be carried out to establish strong correlation between cutaneous manifestations and chronic kidney disease and the effect of longer and more dialysis on cutaneous manifestations.

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