

Cutaneous manifestations in chronic kidney disease patients: A cross sectional study

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Abstract

Background: Cutaneous manifestations are common in chronic kidney disease and range from nearly generalized xerosis and pruritis to uncommon conditions such as hyperpigmentation of exposed areas, acquired perforating dermatosis and nail abnormalities. **Aim:** To study the cutaneous manifestations in chronic kidney disease patients. **Material and Methods:** This was a cross sectional study done on 100 patients with chronic kidney disease as defined by KDOQI guidelines. A thorough skin examination was done by dermatologist also and specific investigations such as skin biopsies, culture and sensitivity for bacterial infections, Gram's stain, potassium hydroxide mount, and fungal culture were performed wherever indicated. **Results:** The prevalence of cutaneous manifestation seen in CKD patients is 73%. Pallor was the most common skin manifestation found in the CKD patients in our study. It was found in 39 patients (39%). Pruritis comprised the main complaint dermatological manifestation in 28 patients (28%). Xerosis was identified as a primary skin lesion in 38 (38%) patients. **Conclusion:** Total 73% patients showed at least one cutaneous manifestation. The prevalence increases with progression of CKD stages and seen mostly in stage 5D and minimum in CKD stage 3. The most common cutaneous manifestation in CKD patients was pallor. Xerosis, pruritis and other were seen predominantly in dialytic patients.

Key words: chronic kidney disease, cutaneous lesions, pallor, xerosis.

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INTRODUCTION

The kidney and the skin are the two large networks of the body with their abundant blood supply, far in excess of their nutritional demands, the former for the constancy of the milieu interior and the latter maintaining mainly homeostasis. No wonder therefore, that they share many diseases and reflect mutually one another's pathology which should be made use of by the clinician. The

effects of chronic kidney disease are complex as it causes dysfunction of multiple organs. Cutaneous manifestations were almost seen in each stages of chronic kidney disease and as the severity of disease progress then these cutaneous manifestations became severe and may also lead to development of new cutaneous manifestations. Cutaneous manifestations are common in chronic kidney disease and range from nearly generalized xerosis and pruritis to uncommon conditions such as hyperpigmentation of exposed areas, acquired perforating dermatosis and nail abnormalities.¹ It has been found that 50 to 100% patients with CKD have at least one associated cutaneous change.^{2,3} The dermatologic complications can significantly impair the quality of life in certain individuals; therefore, earlier diagnosis and treatment is important to improve their quality of life. There are only few studies in the chronic kidney disease patients regarding cutaneous manifestations. The present cross-sectional study was conducted to study the

cutaneous manifestations in chronic kidney disease patients.

MATERIAL AND METHODS

This was a cross sectional study done on 100 patients with chronic kidney disease as defined by KDOQI guidelines (kidney disease outcome quality initiative group rate) attending the Nephrology clinic, General Medicine out-patient clinic and wards. Outpatients and inpatients of CKD those were signed the written informed consent for participation in the study. The CKD patients were classified based on the presence of kidney damage and level of kidney function (glomerular filtration rate [GFR]), irrespective of diagnosis, according to the KDOQI CKD classification.⁴ Staging of these patients were done according to the eGFR using MDRD (modification of diet in renal disease) formula. Patients with CKD stage V were further classified as either stable CKD, hemodialysis-dependent CKD (D-CKD). The severity of xerosis were assessed using a modified version of grading used by Morton.⁵ Each patient was subjected to detailed history and examinations of past records, with special emphasis on records of hypertension, chronic kidney disease, diabetes mellitus and other comorbid conditions. A thorough clinical examination was done, especially dermatological examination.

Inclusion criteria

- Age >18 years of either sex
- eGFR < 60ml/min/1.73 sq. meter.
- CKD stage V (dialysis) - undergoing maintenance hemodialysis (MHD) for at least one month.

Exclusion criteria

- Known dermatological disorder i.e. collagen disorder, primary cutaneous disease etc.
- Known cases of malignant disease
- Patients with drug rashes
- Known HIV, Hepatitis B and C infection
- Pregnant and lactating female
- Patients of acute kidney injury
- Renal transplant recipients
- Patients of peritoneal dialysis

All the participants were subjected to investigations like complete haemogram, Kidney function test, Liver function test, HIV, Hepatitis B, Hepatitis C, Urine routine and microscopic examination, Electrocardiography and USG abdomen and KUB. Estimated GFR (eGFR) was calculated by using MDRD (modification of diet in renal formula). A thorough skin examination was done by dermatologist also and specific investigations such as skin biopsies, culture and sensitivity for bacterial infections,

Gram’s stain, potassium hydroxide mount, and fungal culture were performed wherever indicated.

Statistical analysis

Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ± SD and median. Qualitative variables were correlated using Chi-Square test. Spearsman correlation coefficient and Univariate logistic regression was used to find out association of Stage with manifestations. Odds ratio with 95% Confidence Intervals calculated for selected variables and their significance tested. A p value of <0.05 was considered statistically significant. The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

RESULTS

Of the 100 patients taken for the study, the majority were males (61%), while 39 patients (39%) were females. The mean age group of our study was 47.28 with a standard deviation of 14.94. The majority of patients (24%) belonged to age group of 36-44 years, followed by 20% in age group of 54-62 and 17% in age group of 45-53. 11% each were in the age group of 18-26 years and in the age group of 27-35 years. 10% and 7% patients belonged to age group of 63-71 years and >72 years respectively. Out of 100 patients; 20 patients of stage 3 (20%), 20 of stage 4 (20%), 20 of stage 5 (20%) and 40 of stage 5D (40%).

Table 1: Characteristics of study population

Patient characteristics	No. of cases (%)
Age (years)	
18-26 years	11 (11%)
27-35 years	11 (11%)
36-44 years	24 (24%)
45-53 years	17 (17%)
54-62 years	20 (20%)
63-71 years	10 (10%)
≥72 years	07 (7%)
Sex	
Male	61 (61%)
Female	39 (39%)
CKD stage	
Stage 3	20 (20%)
Stage 4	20 (20%)
Stage 5	20 (20%)
Stage 5D	40 (40%)

In this study, total 73% patients were found to be having at least one cutaneous manifestation. Pruritis comprised the main complaint/ dominant dermatological manifestation in 28 patients (28%). This was not seen in the rest 72 (72%) patients. The two groups were statistically significant (p value = 0.030). The maximum incidence of pruritis was seen in age group of 36-44

years, with 24% population of this age group suffering from pruritis, while highest % of pruritis was seen in >72 yrs. On further evaluating it was found that the majority patients comprised of stage 5 on maintenance hemodialysis i.e., stage 5D. 15 patients (15%) of pruritis were from stage 5D, while six (6%) were from stage 5. Stage 4 and stage 3 patients with pruritis were four (4%) and three (3%) respectively. Further analysis showed that correlation coefficient between pruritis and stage of CKD was 0.202, with a significance level p value- 0.0439. Xerosis was identified as a primary skin lesion in 38 (38%) patients. It was further classified as per Morton Classification into Grade 1 and Grade 2. 32 patients i.e. 32% of total patients or 84.21% of the patients with xerosis had grade 1 xerosis. While six patients i.e. 6% of the total patients or 15.79% of the patients with xerosis had grade 2 xerosis. During further analysis it was seen that the maximum number of cases of xerosis was seen in stage 5 D amongst the CKD patients. They accounted for 23 (23%), seven (7%), five (5%), three (3%) in the stage 5D, 5, 4 and stage 3 respectively. Correlation coefficient between Xerosis and stage of CKD was 0.351 with a significance level p value of 0.0003. Pallor was the most

common skin manifestation found in the CKD patients in our study. It was found in 39 patients (39%), while it was absent in 61 patients (61%). On evaluating the patients with pallor it was seen that maximum number of cases belonged to stage 5D. 25 patients (25%) were in stage 5D. Stage 5, stage 4 and stage 3 had seven (7%), four (4%) and three (3%) patients respectively (p value- 0.007). Correlation coefficient between Pallor and stage of CKD was 0.35 with a significance level p value of 0.0004. Hyperpigmentation was a finding seen in ten patients (10%). Of these six patients (6%) were from stage 5D, two (2%) each from stage 5 and stage 4. Patient from stage 3 was not found to have hyperpigmentation. (p- Value = 0.343). The correlation coefficient between Hyperpigmentation and the stage of CKD was 0.169 with a significance level p value of 0.09. Thus, the data was not significant. Purpura, petechiae and ecchymosis were the other skin lesions found in CKD patients. They were seen in sixteen patients (16%). Maximum were in stage 5D, in eleven (11%) patients. Ecchymosis was the predominant lesion amongst them seen in nine (9%) patients. (p-value 0.078). Thus, data was not significant.

Table 2: Cutaneous manifestations in relation to CKD stages

Cutaneous manifestations	CKD stages				P value and significance
	Stage 3	Stage 4	Stage 5	Stage 5D	
Pruritus	3	4	6	15	0.0439 (S)
Xerosis	3	5	7	23	0.0003 (S)
Pallor	3	5	8	23	0.0004 (S)
Hyperpigmentation	0	2	2	6	0.09 (NS)
Purpura, petechiae and ecchymosis	1	2	2	11	0.078 (NS)
Nail changes	2	5	5	18	-
Hair changes	3	6	9	11	-

Nail changes were found in 30 patients of CKD. The most common nail change being half and half nail (Lindsay nails). It was found in 12 patients of CKD (12%). The other nail changes were white nail, onychomycosis, and brown nail bed arc, Koilonychias in 5%, 4%, 4% and 2%. Other few changes seen were beau's lines, onycholysis and pitting nails. The nail changes were seen maximum in the age group of 54-62 (7%). While the maximum proportion was in the age group of >72 yrs. with changes seen in 5 out of 7 patients (71%). On further evaluating it was found that the nail changes were predominantly found in stage 5D (18% in stage 5D, 5% in stage 4 and stage 5 and 2% in stage 3. Hair changes were seen in 29 patients (29%), with the findings including sparse hair in 19 patients (19%) and lusterless hair in 10 patients (10%). The hair changes were seen maximum in stage 5D in 11 patients (11%), 9 patients (9%) in stage 5, six (6%) and three (3%) in stage 4 and stage 3 respectively. Infections accounted for major cutaneous manifestation in 19 patients (19%). Bacterial infections were seen in eight (8%) patients. Bacterial infections included pyoderma, furunculosis and carbuncle. Fungal infections were seen in 8 patients (8%). These include- P. versicolor, T. cruris and intertrigo. Viral infections were seen in two patients (2%). These included herpes wart and Herpes Zoster. Other infection seen was scabies in one patient.

Table 3: Infections and their distribution in CKD patients

Infections	Frequency	Percentage
Bacterial	8	8%
Fungal	8	8%
Viral	2	2%
Others	1	1%
Absent	81	81%
Total	100	100%

Oral mucosal changes were seen in 18 patients (18%), with most common finding being macroglossia and stomatitis each in nine patients (9%), coated tongue and candidiasis were seen in five patients (5%) and one (1%) patient respectively. 5 patients (5%) had more than one oral mucosal finding. Other skin lesions that were seen in our study in the CKD patients included – perforating disorders-two cases (2%), calciphylaxis in one patient (1%), Uremic frost in two (2%) patients, bullous dermatopathy in one (1%) patient, psoriatic lesion in one patient (1%), malar rash in two (2%) patients.

Photographs showing cutaneous lesions in CKD patients



DISCUSSION

Chronic kidney disease is recognized as a significant worldwide public health problem in the world. Cutaneous manifestations were almost seen in each stages of chronic kidney disease and as the severity of disease progress then these cutaneous manifestations became severe and may also lead to development of new cutaneous manifestations and patients who were on hemodialysis shows improvement and emergence of some cutaneous manifestations. In present study, the prevalence of cutaneous manifestation seen in CKD patients is 73%. On comparison with the others studies this was close to Bencini *et al* (79%),⁶ less to Khanna *et al* (96%)⁴ and Masmoudi *et al* (88%).⁷ The number of patients having pruritis (28%) in the present study is similar to the study of Falodun *et al* (26.7%).⁸ In studies of Singh *et al*⁹ and Udaykumar *et al*¹⁰ the numbers of patients having pruritis were 46.7% and 53% respectively. In present study the number of patients having pruritis was more in dialysis group (Stage 5D) compared to pre dialysis group (Stage 3, 4 and 5). Similar figures were seen in Thomas *et al* studies which indicate that dialysis may not mitigate pruritis.¹¹ In present study, 38% patients are having xerosis which is different from all the recent studies. In present study, xerosis patients having diabetes mellitus were less. Xerosis was seen in 57.5% patients in stage 5D, which was similar to Thomas *et al* study¹¹ with

48.38% and Falodun *et al* study with 69.7% patients.⁸ In present study as the CKD stages progress then the prevalence of xerosis increases. The pigmentation in the present study is seen in 10% which is less compared to studies of Singh G *et al* (36.6%), Udaykumar *et al* (43%),¹⁰ Kolla *et al* (39.4%)¹² and Thomas *et al* (32.3%).¹¹ Even in dialysis group, the percentage of patients having pigmentation (15%) is less compared to studies by Kolla *et al* (39.4%),¹² Thomas *et al* (41.4%).¹¹ However, Falodun *et al* (9.2%)⁸ observed less pigmentation prevalence than our study. This might be due to difficulty in appreciating hyper pigmentation in dark coloured individuals, unless it is extensive. In present study, pallor of the skin is evident in only 39% patients who are less compared to studies of Udaykumar *et al* (60%),¹⁰ Sultan *et al* (45%)¹³ and Thomas *et al* (45.45%).¹¹ In studies of Falodun *et al*,⁸ pallor was seen in only 2.5% which is less compared to present study. In the dialysis group, pallor (58.97%) is similar to previous studies mentioned above except in study of Falodun *et al* which is only 3.9%.⁸ Pallor maximum found in CKD stage 5D and minimum in CKD stage 3, followed by stage 4 and stage 5. In present study, purpura is seen in 16% of patients which is in accordance with studies of Udaykumar *et al* (9%)¹⁰ and Thomas *et al* (10%).¹¹ In the study of Sultan *et al*,¹³ purpura is seen in more number of patients (19%) compared to present study. Nail changes

were present in 30 patients (30%). Of these maximum numbers of cases were due to half and half nails (12%), which is in accordance with study of Singh *et al* (13.3%).⁹ Koilonychia was seen in two patients (2%), which is high compared to study of Thomas *et al* (5%).¹¹ The reason for this may be due to associated anaemia in the present study. Second most common nail finding was white nail seen in 5% patients. Nail changes seen in present study among dialysis group is similar to the studies of Udaykumar *et al*¹⁰ and Sultan *et al*.¹³ Koilonychias (2%) in present study was not in accordance with study of Udaykumar *et al* (18%).¹⁰ Half and half nail is seen in 12% patients and less compared to studies of Udaykumar *et al* (21%)¹⁰ and Sultan *et al* (28%).¹³ In majority of patients, hairs were normal (71%). Only 19 patients (19%) had sparse scalp hair and 10 patients (10%) had lustreless hair. The numbers of patients having hair changes were more in present study compared to that of Falodun *et al* (2.5%).⁸ The reason for this may be due to associated anaemia in the present group. Udaykumar *et al*¹⁰ found sparse body hair (30%), sparse scalp hair (11%) and brittle and lusterless hair (16%) in his study. In study of Sultan *et al*¹³ reported brittle and lusterless hair in (47%), sparse scalp hair (46%) and sparse body hair (27%). Hajheydari *et al*² noticed scalp alopecia in 9.9%, drying and hair fragility in 2% and hair discolouration in 2% of patients. Present study is in accordance with study of Udaykumar *et al*.¹⁰ Hair changes are less compared to Sultan *et al* study.¹³ Infection was present in 19% of patients (Bacterial-8%, Fungal 8%, Viral 2% and others 1%). Infection is seen in 19% patients in present study which is in accordance with study of Falodun *et al* (16.6%).⁸ In study of Thomas *et al*¹¹ 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. In our study, the oral mucosal findings were seen in nineteen patients (19%), however the total number of findings were much more because some patients had more than one finding. This proportion of mucosal finding is much less than previous studies. The most common oral mucosal finding was macroglossia seen in nine patients and stomatitis also seen in nine patients (9%). Other skin lesions seen include malar rash (2%), bullous dermatosis (2%), calciphylaxis (1%), psoriatic lesion (1%). These lesions were also rare in previous studies and thus incomparable with such a small sample size of the study.

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CONCLUSION

Out of 100 patients, 73% patients showed at least one cutaneous manifestation. The prevalence increases with progression of CKD stages and seen mostly in stage 5D and minimum in CKD stage 3. The most common cutaneous manifestation in CKD patients was pallor. Xerosis, pruritis, nail changes, purpura, pallor, pigmentation, infections were seen predominantly in dialytic patients.

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