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Original Research Article

Renal Reflections on the Skin, an in Depth Look at Cutaneous Manifestations in Chronic Kidney Disease

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Abstract:

Background: Chronic kidney disease (CKD) is a widespread and multifaceted condition that affects millions of individuals globally. While its impact on renal function is well-documented, the intricate relationship between CKD and cutaneous manifestations has garnered increasing attention in recent years.

Aims: To study various patterns of cutaneous manifestations in patients with Chronic Kidney Disease and to compare cutaneous manifestations in patients with and without chronic kidney disease.

Materials & Methods: It is a cross sectional descriptive study conducted over 12 months in the department of dermatology and nephrology, King George hospital, Visakhapatnam, a total of 120 patients were included in the study, a comprehensive history, detailed examination, and specific investigations such as skin biopsy, culture and sensitivity for bacterial infections, Gram's stain, potassium hydroxide mount, and fungal culture were done wherever clinically indicated.

Results: Majority of patients (39.2%) belong to age group of 41 to 50 years, with male predominance. 31.7% (38) patients complained of pruritus, Xerosis was seen in 26.7%(32) of patients, The proportion of pigmentation among patients with CKD is 8.3% (10), 55.3% of patients with pruritus were on dialysis, 59.4% of patients with xerosis were on dialysis, 40% of patients with pigmentation were on dialysis.

Conclusion: Pruritus was the most common manifestation in CKD patients followed by xerosis, ecchymosis and pigmentary changes. There is no significant difference in cutaneous manifestations in patients with and without dialysis.

Keywords: Chronic Kidney Disease, Dialysis, Pruritus, Xerosis.

Introduction

The skin, often regarded as a silent witness to internal physiological changes, becomes a canvas upon which the nuanced effects of CKD unfold. This study aims to bridge the gap between nephrology and dermatology, recognizing the skin as an integral player in the broader narrative of CKD.

The integration of dermatology into the broader CKD framework is not merely an academic pursuit but a practical necessity for healthcare professionals. Dermatologic manifestations in CKD patients, ranging from pruritus and xerosis to more complex conditions such as calciphylaxis, present unique diagnostic challenges and therapeutic considerations. Many of them have impact on the quality of life.

Hence early recognition and treatment is essential in reducing morbidity and mortality. Patients with CKD are initially managed with conservative therapy, eventually, they may require hemodialysis. As dialysis has increased the life expectancy of patients with chronic kidney disease, newer cutaneous changes manifest over a period of time. Few conditions improve on dialysis, but dialysis cannot improve the lost endocrine function as a result of renal failure further leading to multiple metabolic abnormalities and associated cutaneous complications [1].Cutaneous manifestations may vary with patients on dialysis and those without dialysis. The present study is undertaken to know the cutaneous manifestations in patients with CKD, their association with dialysis.

Materials and Methods

It is a cross sectional descriptive study conducted over 12 months in the department of dermatology and nephrology, King George hospital, Visakhapatnam.

Inclusion Criteria

- Subjects more than 18 yrs and less than 70 yrs of age.
- Subjects with chronic kidney disease, on dialysis and non-dialysis patients.
- Included patients admitted in nephrology ward, attending nephrology opd, and referred to dermatology opd.

Exclusion Criteria: Patients affected with HIV, renal transplant recipients, patients with acute renal failure, hepatobiliary, pancreatic or thyroid disorders, pregnancy, chronic viral illness, cutaneous and systemic malignancies.After approval from Institutional ethics committee of Andhra Medical College and King George Hospital (No: 37/IEC KGH/APR/2019). A total of 120 patients were included in the study according to aforementioned inclusion and exclusion criteria.

Informed consent was taken from all the subjects before enrolling in this study, A comprehensive history, detailed examination, and specific investigations such as skin biopsy, culture and sensitivity for bacterial infections, Gram's stain, potassium hydroxide mount, and fungal culture were done wherever clinically indicated.

Statistical analysis: Data was entered in MS-Excel and analyzed in SPSS V25. Descriptive statistics were represented using percentages, and quantitative data in mean and standard deviation. Shapiro wilk test was applied to find normality. $P<0.05$ was considered as statistically significant.

In this analysis, 1) Various patterns of cutaneous manifestations in patients with CKD will be represented as frequencies (%) 2) Descriptive statistics (chi- square), will be used for comparing cutaneous manifestations in non-dialysis and dialysis patients with chronic kidney disease.

Results

Among 120 patients, Majority of patients (39.2%) belong to age group of 41 to 50 years, mean age group is 49 years, with male predominance, 62.5% of patients are male.

Table 1: Age distribution among CKD patients

Age	Frequency	%
19-20	5	4.2
21-30	4	3.3
31-40	13	10.8
41-50	47	39.2
51-60	32	26.7
> 60	19	15.8
Total	120	100.0

Diabetic nephropathy is the most common cause of CKD (44.2%), followed by chronic glomerulo nephritis (36.6%), Hypertensive kidney disease (14.2%), Focal segmental glomerulosclerosis (2.5%), polycystic kidney disease (1.7%) and Lupus nephritis (0.8%). Majority of patients (26.7%) had CKD for 3 to 5 years, followed by 25.8% for less than 1 year, 23.3% for 1 to 3 years, 12.5% more than 7 years and only 11.7% of patients for 5 to 7 years. 60% of patients are on dialysis and 40% of patients are without dialysis.

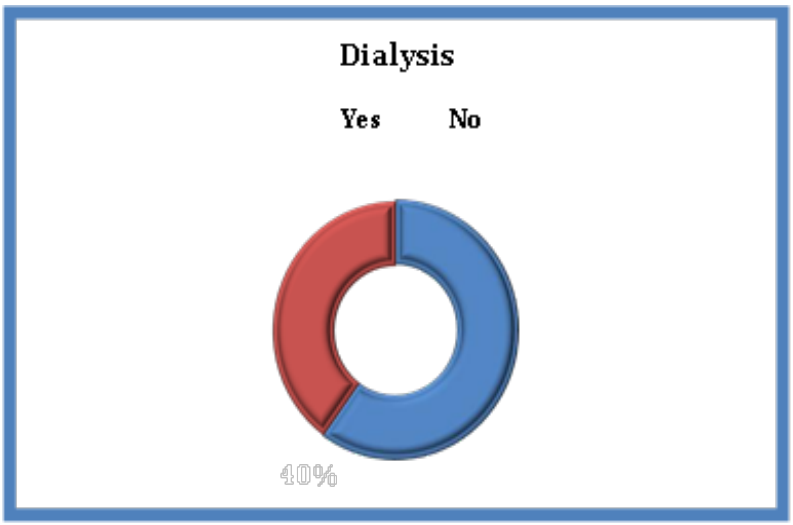

Figure 1: CKD patients on dialysis and without Dialysis

31.7% (38) patients complained of pruritus. Among 38 patients with pruritus, 52.6% (20) of patients had moderate pruritus, 29 % (11) patients had severe pruritus and 18.4% (7) patients had mild pruritus. Xerosis was seen in 26.7% (32) of patients. 43.8% (14) of patients had moderate xerosis, 40.6% (13) of patients had mild xerosis and 15.6% (5) had severe xerosis. The proportion of pigmentation among patients with CKD is 8.3% (10) The proportion of diffuse hyper pigmentation is 7.5% (9) and malar rash is seen in 0.8% (1) of patients with CKD, Ecchymoses is seen in 10% (12) of patients with CKD, Half and Half nails were observed in 5.8%(7) of patients, Dry lusterless hair was observed in 1.7% (2) of patients with CKD and alopecia areata in 0.8% (1) of patients with CKD, 5% (6) of patients with CKD had Kyrle's disease. 1.7% (2) of patients with CKD had Nephrogenic Fibrosing Dermopathy. 5.8% of patients with CKD had Herpes Zoster, proportion of patients with dermatosis neglecta, scabies and trophic ulcer were 3.3% each, 2.5% patients had tinea corporis, proportion of patients with pityriasis versicolor and verrucca vulgaris were 1.7% each. Proportion of patients with cellulitis right limb, tinea cruris, tinea unguum, and varicella were 0.8% each.

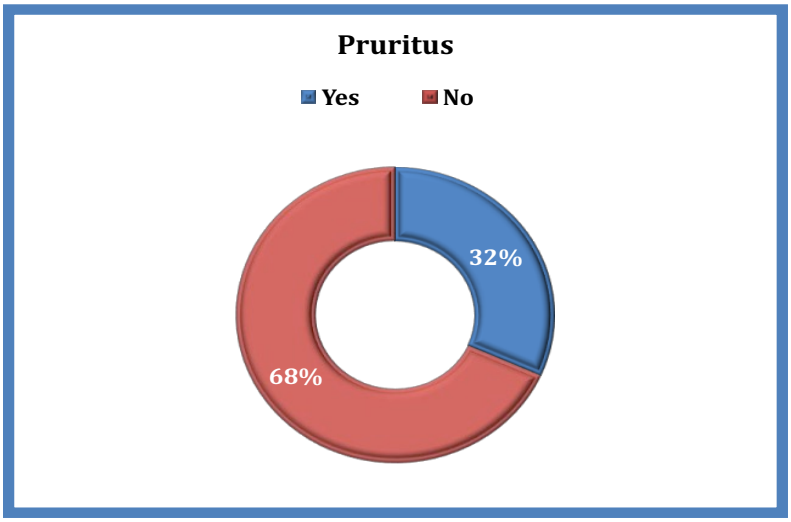

Figure 2: Number of patients with Pruritus

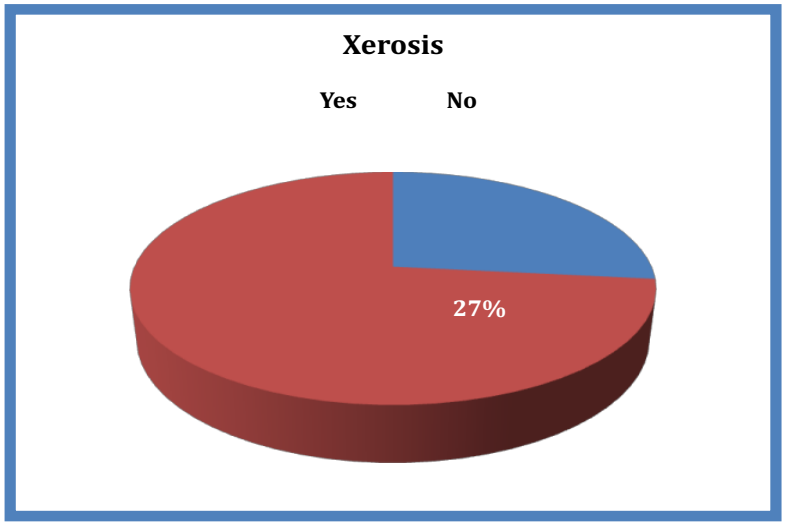

Figure 3: Number of patients with Xerosis

Table 2: Other dermatoses in patients with CKD

Other dermatoses	Frequency	%
Herpes zoster	7	5.8
Dermatosis neglecta	4	3.3
Scabies	4	3.3
Trophic ulcer	4	3.3

Tinea corporis	3	2.5
Pityriasis versicolor	2	1.7
Verruca vulgaris	2	1.7
Cellulitis right limb	1	0.8
Superficial pustular folliculitis	1	0.8
Tinea cruris	1	0.8
Tinea ungum	1	0.8
Varicella	1	0.8
Nil	89	74.2
Total	120	100.0

55.3% of patients with pruritus were on dialysis, 59.4% of patients with xerosis were on dialysis, 40% of patients with pigmentation were on dialysis, 66.7% of patients with Ecchymosis were on dialysis, 71.4% patients with nail changes were on dialysis, 33.3% patients with hair changes were on dialysis, 66.7% patients with kyrle‘s disease were on dialysis, 50% of patients with Nephrogenic fibrosing dermopathy were on dialysis, 67.7% of patients with other dermatoses were on dialysis. P values are not statistically significant.

Table 3: Comparison of cutaneous manifestations in patients with and without CKD

Cutaneous manifestations	Dialysis		Total	P- Value
	Yes Count (%)	No Count (%)		
Pruritus				
Yes	21(55.3%)	17(44.7%)	38 (100%)	
No	51(62.2%)	31(37.8%)	82(100%)	0.55
Xerosis				
Yes	19 (59.4%)	13(40.6%)	32(100%)	
No	53(60.2%)	35(39.8%)	88(100%)	1
Pigmentation				
Yes	4(40%)	6(60%)	10(100%)	
No	68(61.8%)	42(38.2%)	110(100%)	1.7
Ecchymosis				
Yes	8(66.7%)	4(33.3%)	12(100%)	
No	64(59.3%)	44(40.7%)	108(100%)	0.6
Nail changes				
Yes	5(71.4%)	2(28.6%)	7(100%)	
No	67(59.3%)	46(40.7%)	113(100%)	0.7
Hair changes				
Yes	1(33.3%)	2(66.7%)	3(100%)	
No	71(60.7%)	46(39.3%)	117(100%)	0.56
Kyrle‘s disease				
Yes	4(66.7%)	2(33.3%)	6(100%)	
No	68(59.6%)	46(40.4%)	114(100%)	1
NFD				
Yes	1(50.0%)	1(50.0%)	2(100%)	
No	71(60.2%)	47(39.8%)	118(100%)	1
Other Dermatoses				
Yes	21(67.7%)	10(32.3%)	31(100%)	
No	51(57.3%)	38(42.7%)	89(100%)	0.39

Discussion

A total of 120 cases of chronic kidney disease were included in the study, of which 75 were males and 45 were females, ratio of male to female was 1.66:1, which is nearly similar to Rashpa et al [2] study, which included 77 males and 45 females, ratio is 1.71:1 and to Dinah Thersa Levillard and Srinath M Kambil3 study, ratio is 1.77:1. Mean age of CKD patients is 49.05 years, which is closer to Thomas et al [4] study (50.5). Majority of the patients (39.2%) are under the age group of 41 to 50 years, followed by 26.7% under age group 51 to 60 years and the least 3.3% under age group of 19 to 20 years. In a study by Rashpa et al [2], majority (32%) belong to 51 to 60 years.

Majority 26.7% (32) of patients have CKD from 3-5 years where as the least 11.7% (14) have CKD from 5 to 7 years. Mean duration of CKD is 24.62

months which is slightly higher compared to Deepshika khanna et al [1] (17 months) and Rashpa et al [2] (9.3 months) where as it is less compared to Asokan S et al [5] (38.9 months). In the present study among 120 patients with CKD, 60% (72) were on dialysis whereas 40% (48) were without dialysis which is nearly similar to study done by Swarna K Gunipudi et al [6] in which 65% were on dialysis and 35% were without dialysis. The mean duration of dialysis is 12 months, which is nearly similar to Rashpa et al [2] (9.3 months). In the present study, in majority of patients (62.5%) the duration of dialysis is less than 1 year, where as in 1.4% it is more than 5 years.

The most common etiology of CKD in the present study was Diabetic nephropathy which is consistent with studies done by Rashpa, et al [2], Chanda, et al [7], Thomas et al [4]. Unlike studies done by Swarna K.Gunipudi et al [6], Dinah Theresa Levillard and Srinath M Kambil [3] where hypertension is the most common cause of CKD. Chronic glomerulonephritis was the most common cause in studies done by Khanna D et al [1] and Chanda et al [7].Chronic glomerulo nephritis is the second most common cause of CKD in the present study followed by Hypertensive kidney disease, focal segmental glomerulo sclerosis, polycystic kidney disease and lupus nephritis.

Cutaneous Manifestations: Out of 120 patients with CKD, almost all of them presented with one or more cutaneous manifestations.

Pruritus: Pruritus is the most common finding of the present study which is consistent with study done by Maha M Sultan et al [8], P K Kolla et al [9], Abrol S and Sharma R [10].

In the present study, among patients with pruritus, majority (20) of them have moderate pruritus, followed by severe pruritus in 11 patients and mild pruritus in 7 patients. This is consistent with study done by Khanna D et al [1] in which majority of patients had moderate pruritus followed by severe and least number of patients with mild pruritus. In the present study, Pruritus is more in CKD patients with dialysis compared to patients without dialysis but there is no significant association between pruritus and dialysis. This is in contrast with studies done by B Amatya et al [11] and Chanda et al [7] where there is statistically significant association between pruritus and dialysis, B Amatya et al [11] suggested that higher frequency of pruritus among dialysis patients might be a manifestation of allergy against sensitizing agents in dialysis set up.

Xerosis: Xerosis is the second most common manifestation in the present study, which is in consistent with studies done by Maha M Sultan et al [8] and P K Kolla et al [9], who considered high dosage of diuretics, reduction in size of sweat glands, excessive ultrafiltration might be responsible for xerosis.

In the present study, among patients with xerosis, majority of them had moderate xerosis, followed by mild xerosis and severe xerosis was noted in few patients. In the present study, Xerosis was mostly seen in dialysis patients in comparison with non-dialysis patients, this is similar to studies done by Chanda et al [7], Thomas et al [4], Asokan S et al [5], Swarna K Gunipudi et al [6], Dinah Therissa Levillard and Srinath M Kambil [3]. There is no significant difference in the frequency of xerosis in dialysis and nondialysis patients this is similar to study done by B. Amatya et al [11].

Figure 4: Xerosis

Ecchymosis: In the present study Ecchymosis is seen in 10% (12) of patients with CKD of which 8 patients were on hemodialysis and 4 patients were without hemodialysis, In a study done by Rashpa et al [2], ecchymosis were seen in 14.8%(18) patients of which 9 patients were on hemodialysis and it is attributed to increased vascular fragility and platelet dysfunction from high blood urea levels or heparin use during dialysis. Dinah Theresa levillard and Srinath M Kambil [3] reported ecchymosis in 6 patients over extremities, of which 4 patients were on hemodialysis.

Figure 5: Ecchymosis

Pigmentation: In the present study 8.3% of patients (10) with CKD had pigmentary changes; diffuse pigmentation was seen in 9 patients and malar rash in 1 case. P K Kolla et al [9] stated that increased pigmentation might be probably due to failure of kidneys to excrete beta melanocyte stimulating hormone and resultant melanin distributed in basal layer as well as superficial dermis. Malar rash is due to underlying SLE that caused lupus nephritis. Majority of the patients (60%) with pigmentation were without dialysis, this is in contrast to studies done by Thomas et al [4], Chanda et al [7], B. Amatya et al [11] and Asokan S et al [5] where pigmentation was seen more frequently in patients on dialysis.

Nail Changes: In the present study, Lindsay‘s nail or Half and Half nail was the only nail manifestation seen. It was seen in 5.8% of the CKD patients. It is comparable to studies done by B.Amatya et al [11] and Swarna K Gunipudi et al [6], in which half and half nails were seen in 4% and 7 % of CKD patients respectively. Half and half nails are comparatively higher in dialytic group compared to non dialytic group but there is no significant association between half and half nails and dialysis, this is in contrast to study done by Chanda et al [7] in which there was statistically significant higher prevalence of nail changes in dialysis group compared to non dialytic group.

Figure 6: Half and Half Nails

Hair Changes: Hair changes were seen in 2.5% (3) patients in the present study, which include dry lusterless hair in 2 cases and alopecia areata in 1 case, which is low compared to study done by Swarna K Gunipudi et al [6] in which 16% of patients (24) had dry lusterless hair. In a study done by Rashpa et al [2] 12.3% (15) patients had dry lusterless hair. Sparse scalp and body hair were seen in 35.2% and 13.1% respectively. Apparently reduced sebum production and parathormone levels, anemia, stress of ESRD/Dialysis or neglecting hair care were considered as underlying cause to hair changes [12,13,8,14]. Among these 3 cases with hair changes, 1 patient was on dialysis and other 2 were without dialysis. Hair changes are not associated with dialysis.

Figure 7: Thin Lustreless Hair

Perforating Disorders: Among perforating disorders only Kyrles disease was seen in present study, it was seen in 5% (6) of CKD patients, 4 patients were on dialysis and 2 without dialysis, which is nearly similar to Chanda et al [7] who reported Kyrles disease in 4 patients, 3 were on dialysis and 1 without dialysis. There is no significant association between Kyrles disease and dialysis.

Other acquired perforating dermatoses like perforating folliculitis and reactive perforating collagenosis are not reported in the present study.

Figure 5: Kyrles Disease

Nephrogenic Fibrosing Dermopathy: NFD was seen in 2 (1.7%) patients in the present study of which only one was on dialysis. It is similar to study done by Khanna D et al [1], in which 2 patients presented with NFD. There is no significant association between dialysis and NFD in the present study.

Miscellaneous Findings: In the present study, Infections were seen in 19.1% patients which is more than study done by Swarna K Gunipudi et al [6] (13.3%), less than study done by Thomas E et al [4] (26.26%), Rashpa et al [2] (48.4%) P. K Kolla et al [9] (53%) and Abrol S and Sharma R10 (58.3%). In the present study, viral infections like Herpes Zoster, Varicella Zoster, Verrucca were more common followed by fungal infections like dermatophytosis and pityriasis versicolor, bacterial infections like Superficial pustular folliculitis and cellulitis leg.

Opportunistic infections are common occurrence in these patients due to lymphopenia, decreased B cell activity and alteration of T cell subsets and activities. P K Kolla et al [9] considered that high infections were due to diabetes, low albumin, elevated intra cellular calcium, acidosis or repetitive vascular procedures. Trophic ulcer was seen in 4 cases in the present study, which may be due to underlying diabetes mellitus. Dermatosis neglecta is seen in 4 cases in the present study, which may be due to lack of proper hygiene at the site of Arterio Venous fistula which is most probably due to pain, it presented as hyperpigmented plaques which disappeared on cleaning with normal saline gauze.

Figure 6: Dermatosis Neglecta

Conclusion

Pruritus and xerosis were the most common manifestations seen in this study; other changes include ecchymo-ses, malar rash and diffuse hyperpigmentation. Nail changes like half and half nails and hair changes like dry lustureless hair, alopecia areata were seen. Specific dermatosis like Kryles and Nephrogenic Fibrosing dermopa-thy were seen. Other dermatoses include viral infections like herpes zoster, varicella and verrucca vulgaris; Bac-terial infections like cellulitis and superficial pustular folliculitis; fungal infections like dermatophytosis and pityriasis versicolor; Mite infestations like scabies and dermatosis neglecta were seen. There was no statistically significant difference in cutaneous manifestations in patients with and without dialysis.

As we reflect on the collective insights shared within this study, it becomes evident that our understanding of CKD-associated dermatologic conditions is far from complete. There remain avenues for further research, innovation, and clinical exploration, particularly in elucidating underlying mechanisms, identifying novel bi-omarkers, and refining therapeutic modalities.

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