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# Study of Cutaneous Manifestations in End Stage Kidney Disease Undergoing Hemodialysis

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## Abstract

**Introduction:** The prevalence of cutaneous manifestations in hemodialysis patients is increasing.

**Objectives:** The aim of this study was to determine the prevalence and pattern of various cutaneous manifestations in patients undergoing maintenance hemodialysis.

**Material and Methods:** A hospital based cross sectional study was conducted in patient undergoing maintenance hemodialysis at least for three months in dialysis unit of Manipal Teaching Hospital Pokhara, Nepal during the period from August 2018 to January 2019. A demographic questionnaire and a checklist about cutaneous disorders were used for data collection. Patients with cholestatic liver disease or acute hepatitis, active infection, active malignancy, patient with acute kidney injury, patient undergoing peritoneal dialysis and renal transplant recipient were excluded from study.

**Results:** Total 80 patients undergoing maintenance hemodialysis were included. Among them, 52 (65%) patients were male. The mean age of study population was 51.95±14.96 years. The mean duration of dialysis was 40.28±11.09 months. The most common cause of end stage kidney disease was diabetic nephropathy. The most common cutaneous manifestations were pigmentation (82.5%), nail changes (75%), xerosis (70%) and pruritis (50%).

**Conclusions:** The results of this study revealed that patients on hemodialysis were associated with multiple cutaneous symptoms, the most prevalent of which were pigmentation and nail disorders. Therefore, early diagnosis of these problems is a major step in improving the quality of life in these patients.

**Key words:** Diabetic Nephropathies; Kidney Failure, Chronic; Pruritus; Renal Dialysis

## Introduction

A wide array of skin diseases occurs in patients with chronic kidney disease. These diseases are seldom related to the underlying renal diseases but are more frequently directly or indirectly associated with 'uremia' in its broadest sense. With an almost 100% prevalence in dialysis populations, skin disorders are frequently the subject of patients' complaints.<sup>1</sup> They can significantly affect patient's quality of life with negative impact in their mental and physical health and early detection and treatment can dramatically alter their course with improvement of quality of life.<sup>2,3</sup>

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A fair knowledge of the dermatological conditions that can arise in the setting of kidney disease is, therefore, very useful to practicing nephrologists.

In developed countries, increased availability of improved dialysis therapy has led to a decrease in metabolic and cutaneous complications.<sup>4</sup> However,

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in Nepal inadequate and unaffordable facilities for dialysis and renal transplantation leave most patients untreated or undertreated, hence cutaneous complications are more common in dialysis patients.

In addition, Nepalese population is subjected to the harmful effects of its tropical climate, with high incidence of infection affecting the cutaneous outcome adversely.<sup>4</sup>

There is a paucity of studies assessing cutaneous anomalies in end stage kidney disease (ESKD) patients undergoing hemodialysis in Western region of Nepal. Therefore, the present study is undertaken to study prevalence and pattern of cutaneous manifestations in maintenance hemodialysis patients in hospital setting.

## Material and Methods

A hospital based cross sectional study was done in patient undergoing maintenance hemodialysis at least for three months of either sex, aged 18 years and above, attending dialysis unit of Manipal Teaching Hospital Pokhara, Nepal during the period from August 2018 to January 2019. The study was approved by Institutional Review Committee of Manipal College of Medical Sciences.

Patients with cholestatic liver disease or acute hepatitis, active infection, active malignancy, patient with acute kidney injury, patient undergoing peritoneal dialysis and renal transplant recipient were excluded from study.

A performa was used for data collection. Patients demography including name, age, sex, occupation and address, duration of maintenance hemodialysis, any dermatological complaints at present or past and history of drug hypersensitivity was recorded. Blood investigations like hemoglobin, blood urea and serum creatinine, hepatitis serology (hepatitis B surface antigen and hepatitis C antibody), serum calcium, phosphorus was done. Patients were thoroughly examined and skin, mucous membrane, hair and nail changes was noted. Scraping for fungus and pus for culture and sensitivity was done whenever necessary.

A comprehensive and systemic dermatologic examination including skin appendages and confirmation of presenting lesion was performed by qualified senior dermatologist.

All the data was entered in Microsoft Excel spread sheet. Analysis was performed using statistical

software (IBM SPSS statistics 20, SPSS Inc. an IBM Corp, NY USA). Continuous data was described as arithmetic mean and standard deviation and categorical data as actual numbers and percentages.

## Results

Total 80 patients undergoing maintenance hemodialysis were included in our study. Among them, 52 (65%) patients were male. The mean age of study population was 51.95±14.96 years. The mean duration of dialysis was 40.28±11.09 months. Diabetes was the most common cause of ESKD in these patients ( $n=50$ ), followed by chronic glomerulonephritis ( $n=9$ ), hypertension ( $n = 9$ ), obstructive nephropathy ( $n =1$ ) and others include polycystic kidney ( $n= 6$ ), malignancy ( $n=4$ ) and unknown cause ( $n=3$ ) cases. Other baseline characteristics in these patients are outlined in table-1.

One or more cutaneous manifestations were present in 92% of patients. Pigmentation (82.5%), nail changes (75%), xerosis (70%) and pruritis (50%) were the most common observed findings.

Diffuse pigmentation was the most common findings seen in 66 (82.5%) patients. Out of these 66 patients, pigmentation was generalised in 60%, localised in 25% and patchy in 15%. Face and extremities were commonly involved. Other pigmentary changes observed are listed in table-2.

The second most frequent finding was nail changes. Longitudinal striations of nail were the most common nail changes seen in 60 (75%) patients. Other changes included pallor in 33(41.3%), nail pitting in 27(33.8%), absent lunula in 24(30%), half and half nail in 10(12.5%) and leukonychia in 2 (2.5%) patients shown in table-3.

Xerosis was found in 56 (70%) patients. Among these 56 patients, xerosis was generalised in 40 (71.42%), localised in 10 (17.85%), and patchy in 6 (10.71%) patients. Xerosis was more common in diabetic patients. Pruritus was seen in 40 (50%) patients. It was generalised in 28 (70%), localised in 10 (25%) and patchy in remaining 2 (5%) patients depicted in table-4.

In oral mucosal changes, coated tongue was seen in 34 (42.5%) patients and 33 (41.25%) patients had diffuse alopecia. Twenty-five (31.25%) patients in this study had cutaneous infections; 12 (15%) were viral, 9 (11.5%) were bacterial, 4 (5%) were fungal shown in table-5.

**Table 1:** Baseline characteristics and etiology of ESKD of study population

<b>Mean age (years)</b>	<b>51.95±14.96</b>
Gender (Male vs Female)	52 vs 28
Haemoglobin (gm/dl)	8.50±1.82
Blood urea (mg/dl)	125.77±1.82
Serum Creatinine (mg/dl)	10.07±3.09
Duration of dialysis (months)	40.28±11.09
<b>Etiology of ESKD</b>	
Diabetic nephropathy (%)	50 (62.5)
Chronic glomerulonephritis (%)	9(11.25)
Hypertensive nephropathy (%)	7 (8.75)
Obstructive nephropathy(%)	1 (1.25)
Others (%)	13(16.25)

**Table 2:** Skin and pigimentary changes in study population

<b>Pigimentary changes</b>	<b>Total n =80 (100%)</b>	<b>DN n=50 (62.5%)</b>	<b>CGN n= 9 (11.3%)</b>	<b>HTN n= 7 (8.8%)</b>	<b>O.Nephropathy n= 1 (1.3%)</b>	<b>Others n=13 (16.25%)</b>
Diffuse brown pigmentation	66(82.5%)	46	9	5	0	6
Skin pallor	9(11.3%)	5	1	1	0	2
Yellowish discoloration	7(8.8%)	3	0	0	1	3
Brownish to slate gray pigmentation	5(6.3%)	4	0	1	0	0
<b>Skin infections</b>						
Herpes Zoster	10(12.5%)	8	0	2	0	0
Tinea cruris	4(5%)	4	0	0	0	0
Tinea corporis	3(3.8%)	2	0	1	0	0
Tinea pedis	2(2.5%)	1	0	1	0	0
Diabetic foot ulcer	2(2.6%)	0	0	2	0	0
Wart	2(2.5%)	2	0	0	0	0
Furuncle	2(2.6%)	2	0	0	0	0

DN: Diabetic nephropathy; CGN: Chronic glomerulonephritis; HTN: hypertension; Uropathy: obstructive uropathy

**Table 3:** Nail changes in study population.

<b>Nail changes</b>	<b>Total n =80 (100%)</b>	<b>DN n=50 (62.5%)</b>	<b>CGN n= 9 (11.3%)</b>	<b>HTN n= 7 (8.8%)</b>	<b>O.Nephropathy n= 1 (1.3%)</b>	<b>Others n=13 (16.25%)</b>
Longitudinal striations	60(75%)	41	7	6	1	5
Pallor	33(41.3%)	18	4	2	0	9
Pitting	27(33.8%)	14	2	3	1	7
Absent lunula	24(30%)	19	1	2	0	2
Half and half nail	10(12.5%)	8	0	1	0	1
Subungual hyperkeratosis	4(5%)	2	1	0	0	1
Leuconychia	2(2.5%)	2	0	0	0	0

DN: Diabetic nephropathy; CGN: Chronic glomerulonephritis; HTN: hypertension; O.Nephropathy: Obstructive nephropathy

**Table 4:** Dermatological changes in study population.

Dermatological changes	Total n =80 (100%)	DN n=50 (62.5%)	CGN n= 9 (11.3%)	HTN n= 7 (8.8%)	O.Nephropathy n= 1 (1.3%)	Others n=13 (16.25%)
Xerosis	56(70%)	37	6	4	1	8
Pruritus	40(50%)	26	4	3	1	6
Seborrheic dermatitis	4(5%)	3	0	0	0	1
Eczema	4(5%)	2	0	1	0	1
Bilateral pedal edema	3(3.8%)	2	1	0	0	0
Excoriations	3(3.8%)	1	0	1	1	0
Lichen simplex chronicus	2(2.5%)	0	0	0	0	2
Acneiform eruptions	2(2.5%)	2	0	0	0	0
Prurigo nodularis	2(2.5%)	1	0	1	0	0
Ecchymotic patch	2(2.5%)	1	1	0	0	0
Multiple papular lesions	2(2.5%)	0	1	0	1	0
Lichenified plaque with excoriations	2(2.5%)	0	1	0	1	0
Reticular patterned dry ichthyotic lesion	2(2.5%)	1	0	0	1	0
Uric acid tophi/ecchymotic patches	2(2.5%)	1	0	0	1	0
Vitiligo	1(1.3%)	1	0	0	0	0
Annular eczema	1(1.3%)	1	0	0	0	0
Chronic dermatitis	1(1.3%)	0	0	0	0	1
Dupuytren's contracture	1(1.5%)	0	0	0	1	0
Folliculitis of scalp	1(1.3%)	0	0	0	1	0
Skin tag/angioma	1(1.3%)	1	0	0	0	0
Stria seen over trunk	1(1.3%)	0	0	0	0	1

**Table 5:** Oral mucosal and hair changes of study population

Oral mucosal changes	Total n =80 (100%)	DN n=50 (62.5%)	CGN n= 9 (11.3%)	HTN n= 7 (8.8%)	O. Nephropathy n= 1(1.3%)	Others n=13 (16.25%)
Coated tongue	34(42.5%)	24	3	4	1	2
Fissured tongue	21(26.3%)	13	2	4	0	2
Xerostomia	6(7.5%)	5	1	0	0	0
Hypertrophic papilla in 1/3rd of tongue	4(5%)	2	0	0	0	2
Pallor	2(2.5%)	2	0	0	0	0
Erythematous lesion on tongue	1(1.3%)	1	0	0	0	0
Venous lake over tongue, upper lip	1(1.3%)	1	0	0	0	0
<b>Hair changes</b>						
Diffuse alopecia	33(41.25%)	22	6	3	1	1
Androgenic alopecia	24(30%)	18	2	4	0	0
Sparse body hair	2(2.5%)	2	0	0	0	0

DN: Diabetic nephropathy; CGN: Chronic glomerulonephritis; HTN: hypertension; O.Nephropathy: Obstructive nephropathy

## Discussion

Cutaneous manifestations are very common in patients with ESKD.<sup>4</sup> In our study population 92% had some form of cutaneous complaints. Nunley et al reported 50-100% patients with chronic kidney disease have at least one cutaneous manifestation.<sup>5</sup> Pico et al found prevalence of cutaneous disease in 100% of patient.<sup>6</sup> In study conducted by Khanna et al, cutaneous disorders were found in 96% of patients.<sup>4</sup> Similarly, study carried out in Nepal by Shrestha et al found 86% of hemodialysis patients have cutaneous disorder.<sup>7</sup>

Pigmentation (82.5%), nail changes (75%), xerosis (70%) and pruritus (50%) were most commonly observed findings. These findings are consistent with the findings of other studies by Pico et al, Khanna et al, Amatya et al and Robinson et al.<sup>4,6,8,9</sup>

Pigmentation was found in 82.5% of patient in our study. Similarly, study done in Pakistan by Muhammad et al, found pigmentation in 86% of hemodialysis patients.<sup>10</sup> This high prevalence might be probably due to the failure of kidneys and dialysis to excrete beta melanocyte-stimulating hormone and resultant melanin deposition in basal layer as well as in superficial dermis.<sup>11</sup> Tropical climate and sun exposure may result in increased prevalence of diffuse hyperpigmentation as is evident from predominant involvement of photo-exposed areas with sparing of trunk in our study. On contrary to our study, Raiesifar et al and Kolla et al observed pigmentation only in 46% and 40% of hemodialysis population respectively in their study.<sup>12,13</sup>

Ungual manifestations occurring in patients with ESKD are polymorphic and diverse. The prevalence of nail changes in patient on hemodialysis has been variable in different studies (52-70%).<sup>14,15</sup> Nail changes was the second most common cutaneous disorder in our study. In study done by Ashok et al, showed only 53% patients had nail disorders.<sup>14</sup> Aqil et al in their study found 80% patients had nail disorders. Longitudinal striations were found in 64.2% patients in their study.<sup>15</sup> Similarly in this study longitudinal striations were found in 75% of study population. In our study, absent lunula, was observed in 30% patients. It may be attributed to anaemia and metabolic abnormalities.<sup>16</sup> Lindsay's nails (half and half nail) was seen in 12.5% patients in our study. Contrast to our study, Thomas et al showed 36.36% patients had half and half nail, the most common nail disorder in their study.<sup>17</sup>

Xerosis was found in 70% patients in our study. Similar findings were reported in different studies done in hemodialysis population.<sup>4,17,18</sup> A reduction in the size

and functional abnormality of eccrine sweat glands, suggesting compromised eccrine secretion leading to epithelial dehydration may contribute to the development of xerosis.<sup>19</sup> In addition, other factors like poor socioeconomic status of our patients, high dose diuretics, excessive ultrafiltration, greater exposure to dust and detergents and poor use of emollients in general are attributed for the cause of xerosis. Tropical climate with greater sun exposure and resultant chronic dehydration may be contributory.<sup>20</sup>

Pruritus is a common symptom in hemodialysis patients that can cause severe discomfort. It is difficult to treat, as its underlying pathophysiological mechanism is not precisely known.<sup>2</sup> The prevalence of pruritus varies between 30% and 64% in the literature.<sup>21,22</sup> We found that 50% of our patients had pruritus, which is comparable to prior reports.<sup>4,7,13,23</sup> Pruritus was more frequent and severe in diabetics in our study. Dry lustreless skin could have contributed for such a high percentage in our study group. Morton et al showed lower hydration of stratum corneum in uremic patients with pruritus and dry skin promotes sensation of itch by lowering the threshold for itch.<sup>24</sup>

Mucosal disorders like coated tongue and fissured tongue were seen in 42.5% and 26.3% respectively of our study patients. Hajheidari et al have reported a prevalence of 24%, with the most common finding being furred tongue (8%), while Yaghubi et al reported a prevalence of mucosal disorders of 29%, with the most common finding being gingivitis.<sup>25,26</sup>

Cutaneous infection was seen in 31.5% patient in present study, among them 12 (15%) were viral, 9 (11.5%) were bacterial, 4 (5%) were fungal. In contrast to our study, Udaykumar et al showed higher prevalence of infections like fungal (30%), bacterial (13%) and viral (12%) infections.<sup>1</sup> Patients with chronic kidney disease have impaired cellular immunity due to a decreased T lymphocyte cell count contributing to high prevalence of infection in these patients. Hair changes were observed with diffuse alopecia in 33 (41.25%) and androgenic alopecia in 24 (30%) patient in our study whereas Thomas A et al showed 16 (16.16%) patients had sparse body hair and 7 (7.07%) patients had dry lustreless hair.<sup>17</sup>

## Conclusion

Present study found that there is a high prevalence of cutaneous manifestations in hemodialysis patients. Pigmentation, nail disorders, xerosis and pruritus were the most common changes. Recognition and management of some of these cutaneous

manifestations vastly reduce the morbidity and improve the quality of life. We suggest some prophylactic procedures such as application of moisturizers for prevention of dryness, avoiding sun

light for prevention of pigmentation changes, and mouth hygiene for prevention of oral lesions. These measures can help patients on hemodialysis to have better cutaneous and mucosal conditions.

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