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Dermatological features who endure chronic renal failure with or without dialysis

Lina Malek[1], Ali Atif[2], Shaheen Sultana[3], Md Raihan ul Islam[1], Rebeka Sultana Liza[1]
[1] Department of Dermatology and Venereology, Vita Skin, Dhaka, Bangladesh
[2] Department of Maxillofacial Surgery, Saraswati Dental College & Hospital, Lucknow, Uttar Pradesh, India
[3] Department of Dermatology and Venereology, Miracle Aesthetics, Dhaka, Bangladesh

Abstract
Background and aim: Skin problems are commonly developed in chronic kidney disease. Our study aimed to assess and compare dermatological appearances in patients with chronic kidney disease (CKD) and end-stage renal disease at distinctive stages, non-dialysis patients, and hemodialysis patients**.**
Methodology: We conducted the study in the Department of Nephrology and Department of Dermatology and Venereology of Dhaka Medical College Hospital. Dhaka. The time period was January 2019 to June 2019. The study design was descriptive cross-sectional. All patients who were diagnosed at different stages of CKD irrespective of the requirement of dialysis or not were enrolled in the study by purposive sampling from the Department of Nephrology and the Department of Dermatology and Venereology of Dhaka Medical College Hospital, Dhaka. Thereafter, they were scrutinized according to eligibility criteria and 60 patients were finalized. A pre-tested, observation-based, peer-reviewed data collection sheet was prepared before the study. Data regarding clinical biochemical and surgical profiles were recorded. Data were compiled, edited, and analyzed.
Results: The mean age of the undialysed patients and dialyzed patients were 46.73±8.79 years (age range: 18 - 60 years) and 54.79±6.27 years (range: 21 - 59 years) respectively. Among 50 undialysed patients, 32(64%) were male and 18(36%) were female. On the contrary. among 50 dialyzed patients 38(76% were male and 12(24%) were female. Out of 50 dialyzed patients, the highest 18(36%) had the duration of disease for 25-36 months. Out of 50 undialysed patients 36(72%), 12(24%), and 2(4%) had CKD stage 3, 4, and 5 respectively whereas all the dialysed patients were diagnosed an ESRD or stage 5 disease. Out of 50 undialysed patients, the highest 27(54%) had pruritus which was subsequently followed by 16(32%) Xerosis manifestation.
Conclusion: Xerosis, pruritus, and hyperpigmentation are frequently evident cutaneous manifestations of CKD patients.

Keywords: chronic kidney disease, uremia, hemodialysis

Introduction

Skin is a complex and versatile structure that plays a vital role in maintaining the overall health and well-being of an individual. In addition to its protective function, the skin has various other important roles, such as regulating body temperature, sensing and responding to external stimuli, and facilitating the elimination of waste products. It is the most visible and accessible organ in the body and can provide important diagnostic opportunities for disorders affecting internal organs, including the renal system [1]. Patients with chronic kidney disease will develop many skin problems. These disorders are sometimes associated with underlying renal failure, although they are more commonly associated with "uremia" in the broadest definition. Skin problems were a frequent source of patient complaints in the dialysis group, with a frequency approaching 100% [2]. CKD was defined as signs of kidney damage over three months, with or without reduced filtration rate, abnormal urine findings, abnormal kidney imaging, genetic disease, or histologically confirmed disease [3-5].

Several skin changes, including itching, dry skin, hyperpigmentation, and acquired perforation dermatitis, are known to occur in the absence of hemodialysis. “Nephrogenic dermatosis” and “hemodialysis bullous dermatosis” appear only when hemodialysis is started. The advent of hemodialysis as a treatment for chronic kidney disease (CKD) has virtually eliminated geluria and uremic erythema, the most common skin abnormalities seen before dialysis [6]. With the advent of dialysis, these skin lesions have become less common. However, many new abnormalities of the skin and adnexa have developed, such as nephrogenic dermatosis, which may be associated with calcification and metastatic calcification. In some cases, xerosis is the most common skin abnormality (46-90%) [7-9]. Eccrine sweat gland hypoplasia may be a factor, while high-dose diuretic regimens have also been suspected.[10-11] Itching is one of the most visible symptoms and signs of skin discomfort of CKD.[10-13] Diabetics are susceptible to bacterial infections. Onychomycosis is the most common fungal infection, and it is also much more common in diabetics. Patients with CKD have weak cellular immunity due to lower T cell counts, which may explain the higher frequency of fungal infections, warts, herpes simplex, and shingles are among the viral infections [10].

Immunosuppression causes skin changes such as increased susceptibility to infection and the development of malignant and precancerous lesions. The most common type of skin cancer is basal cell carcinoma. Actinic keratosis develops in sun-exposed areas and can progress to squamous cell cancer. In some ways, nephrogenic dermatosis (NFD), a new disease whose cause is still unknown, resembles scleroderma [11]. The majority of affected patients are on dialysis and many people have to undergo hemodialysis after failing to have a kidney transplant. NFD has also been reported in some patients with chronic kidney disease. The histology of NFD is similar to scleroderma, with

proliferation of fibroblasts in the dermis and subcutaneous septum, and increased collagen and mucus production in the skin and septum [9]. Other skin lesions include Observed conditions include melasma, skin tags, jock itch, idiopathic enteric hypopigmentation, insulin-induced lipoatrophy, vitiligo, diabetic dermatosis, melasma, fissures of the feet, increased plantar keratosis, papular urticaria, chronic dermatitis of the legs, seborrheic dermatitis of the scalp, varicose eczema and Schamberg's disease [15].

In most cases, these dermatological conditions are not part of the irreversible signs of CKD, which require proper attention and appropriate diagnosis, and in most cases, treatment can help relieve patients' symptoms [16]. Our study aimed to evaluate and compare side effects on patients' skin manifestations in patients at different stages of chronic kidney disease (CKD) and end-stage renal disease, pre-dialysis and dialysis, know the dermatological manifestations in patients at different stages (stage 3, 4, 50) of chronic kidney disease (CKD) not on hemodialysis, know the dermatological manifestations in patients with end-stage renal disease (stage 5), on hemodialysis, compare the manifestations dermatology in patients with chronic kidney disease (CKD) at various stages and end-stage renal failure, not on dialysis and dialysis.

Materials and Methods

We performed a cross-sectional descriptive study at the Department of Internal Medicine, Dermatology and Venereology, Dhaka Medical College Hospital, Dhaka. Data were collected from January 2019 to June 2019. Patients with chronic kidney disease (CKD) at various stages with or without hemodialysis from the Department of Nephrology and the Department of Dermatology and Venereology of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, during the study period learn time was included in the study. The total number of respondents was 100. Our sampling was purposive [12].

Inclusion criteria were for people aged 13 to 60 years of both sexes, patients in various stages of chronic kidney disease (CKD) with or without dialysis, presence of at least one skin feature, Stage 5 patients on hemodialysis Interviewed at least twice a week for at least a month were selected patients who agreed and were willing to comply with the study protocol. Additionally, we maintained certain exclusive criteria patients with coexisting malignancy were excluded from the study, stage 5 patients on maintenance hemodialysis (MHD) less than twice per week for at least one month, patients on hemodialysis after failed kidney transplant, patients undergoing peritoneal dialysis, patients not willing to consent to participate in the study.

Data were collected by face-to-face interviews and from hospital records and recorded in questionnaires. Information is collected by medical history and clinical examination. Data were analyzed by computer using SPSS software with 16 software packages. Statistical significance was set at 0.5 and the confidence interval at 95% [13]. Significance was measured using appropriate procedures such as the chi-square test (χ^2), relative risk measure (RR), t-test, proportion (d), ANOVA test, and other tests, as appropriate. The study was conducted under the guidance of experienced clinical experts who regularly monitored the diagnosis of cases and the operation of the study protocol. The principal investigator devotes at least 20% of his or her daily activities to the smooth running of the study. Have weekly meetings with supervisors to find problems and come up with suggested solutions. A thorough literature search was performed and the data collection was sufficiently robust. This is an objective study, under the direct supervision of experienced dermatologists and medical professionals.

Table 1: Distribution of patients according to age (n=100)

Age groups (in years)	Frequency (n=100)		Total
	Undialysed (n=50)	Dialysed (n=50)	
≤20	1 (2%)	0 (0%)	1
21 – 30	3 (6%)	1 (2%)	4
31 – 40	8 (16%)	3 (6%)	11
41 – 50	31 (62%)	21 (42%)	52
51 – 60	7 (14%)	25 (50%)	32
Mean age ± SD	46.73±8.79	54.79±6.21	52.63±8.31
Range	18 – 60	21 – 59	18 – 60

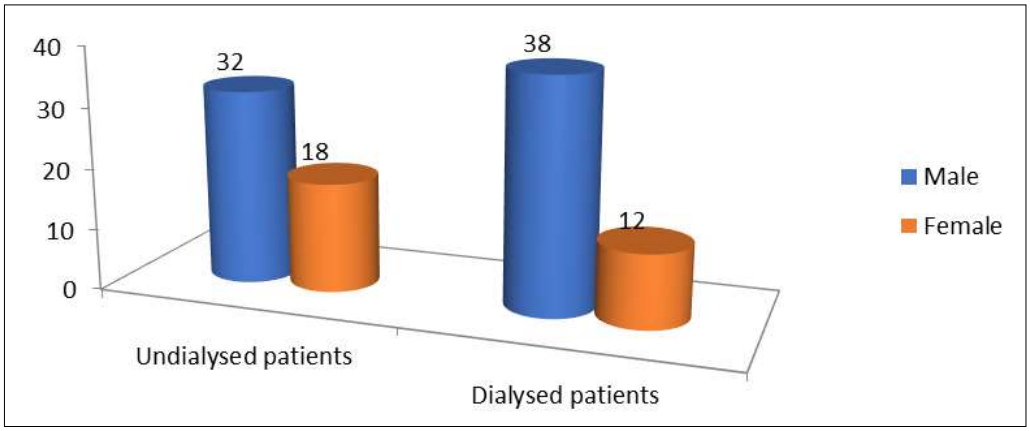

Fig 1: Distribution of patients according to sex (n=100). This is the Fig. 1 legend.

Table 2: Distribution of patients according to duration of disease (n=100)

Duration of disease (in months)	Undialysed (n=50)	Dialysed (n=50)	Total	p-value
1 – 12	14 (28%)	6 (12%)	20	
13 – 24	17 (34%)	5 (10%)	22	0.04[S]
25 – 36	2 (4%)	18 (56%)	20	
36 – 48	11 (22%)	13 (2%)	24	
49 – 60	6 (12%)	8 (16%)	14	
The P-value was calculated by the chi-square test S: Significant p-value was significant at <0.05				

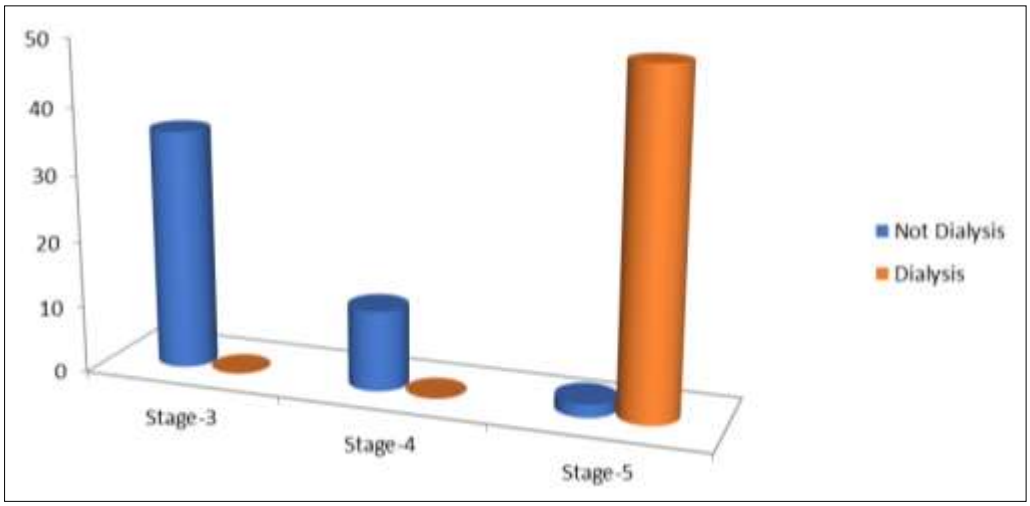

Fig 2: Distribution of patients according to stages of CKD in both groups (n=100). This is the Fig. 2 legend.

Table 3: Distribution of patients according to cutaneous manifestations (n=100)

Duration of disease (in months)	Undialysed patients (n=50)	Dialysed patients (n=50)	p-value
Xerosis	16 (32%)	35 (70%)	<0.001[S]
Pruritus	27 (54%)	22 (44%)	0.51[NS]
Pigmentation	11 (22%)	21 (42%)	0.041[S]
Perforating dermatome	0 (0%)	5 (10%)	0.07[NS]
Nail changes	12 (24%)	10 (20%)	0.73[NS]
Hair changes	5 (10%)	14 (28%)	0.013[S]
Infections	6 (12%)	9 (18%)	0.36[NS]
Mucosal changes	3 (6%)	4 (8%)	0.801[NS]
The p-value was calculated by the chi-square test S: Significant NS: Not significant p-value was significant at <0.05			

Results

Age distribution

Table 1 shows that among 50 patients in each group, the highest 31(62%) undialysed patients came from the 41-50 years age group which is in contrast to 25(50%) dialysed patients from the 51-60 years age group. Besides, 8(16%), 7(14%), 3(6%), and 1(2%) undialysed patients belonged to 31-40 years, 51-60 years, 21-30 years, and ≤20 years respectively. Likewise, 21(42%), 3(6%) and 1(2%) patients who underwent dialysis belonged to the 41-50 years, 31-40 years, and 21-30 years age group respectively. The mean ages of the undialysed patients and dialyzed patients were 46.73±8.79 years (age range: 18 – 60 years) and 54.79±6.21 years (range: 21 – 59 years) respectively. (Tab.-1)

Sex distribution

Figure-1 shows that among 50 undailysed patients, 32(64%) were male and 18(36%) were female. On the contrary, among 50 dialysed patients 38(76% were male and 12(24%) were female. The male-to-female ratio in both groups was 1.7:1 and 3.16:1 respectively. (Fig.-1)

Duration of disease

Table 2 shows that among 50 dialyzed patients, the highest 17(34%) had the duration of disease for 13-24 months. Besides, 14(28%), 11(22%), 6(12%), and 2(4%) had duration of disease for 1-12 months, 36-48 months, 49-60 months and 25-36 months respectively. On the other hand, out of 50 dialyzed patients, the highest 18(36%) had the duration of disease for 25-36 months. Besides, 13(26%), 8(16%), 6(12%), and 5(10%) had a duration of 36-48 months, 49-60 months, 13-24 months, and 1-12 months respectively. (Tab.-2)

Stages of CKD

Figure-2 shows that out of 50 dialyzed patients 36(72%), 12(24%), and 2(4%) had CKD stages 3, 4, and 5 respectively whereas all the dialyzed patients were diagnosed as ESRD or stage 5 disease. (Fig.-2)

Cutaneous manifestations

*Single patients may have multiple skin manifestations.

Table 3 shows that out of 50 undialysed patients, the highest 27(54%) had pruritus which was subsequently followed by 16(32%) Xerosis manifestations. Besides 12(24%), 11(22%), and 6(12%) had nail change, pigmentation, and infections respectively. On the contrary, 35(70%), and 22(44%) patients had Xerosis pruritus and pigmentation respectively among 50 dialysed patients. Among all the cutaneous manifestations of CKD patients, xerosis, pigmentation, and hair changes show statistically significant differences (p=<0.05). (Tab.-3)

Discussion

In 2009, Nunely *et al* 54 reported that 50% to 100% of patients with CKD had at least one cutaneous manifestation, and 74% of patients had at least one cutaneous manifestation in our patient. The appearance of skin manifestations in our patients was independent of age and gender. The results obtained in this study were compared with similar studies previously performed in the study by Thomas EA *et al* 29. The number of patients in this study was 100 people, divided into two equal groups according to treatment method. Fifty patients each were grouped into the non-dialysis group or the medical management group and the hemodialysis group. The overall average age of CKD patients in this study was 52.63 years old, equivalent to the study by Hajheydari *et al* 26, while the average age was lower in the study by PK Kolla *et al* 30. The majority of patients in both groups were in the 41-50 age group, i.e. 31 (62%) in the non-dialysis group and 21 (42%) in the dialysis group. These results are also comparable to some previous studies [14]. The reason for the high number of patients in this age group may be due to chronic diseases such as hypertension and diabetes, which are common in older people much older age today.

In the present study, there was a male predominance, which is consistent with the research groups of Singh *et al*. 24 and Thomas EA *et al*. 29. The reason may be due to the higher incidence of hypertension and diabetes in men than in women. Care-seeking and self-reported behaviors are more common in men because they are the earning members of the family. In our study, in the non-dialysis group, there were 32 (64%) men and 18 (36%) women. The male/female ratio is 1.7:1. In contrast, in the hemodialysis group, there were 38 (76%) men and 12 (24%) women. The male/female ratio in this group was 3.16: 1. The results of this study were nearly identical to those of the previous study.15 The mean duration of CKD at the time of presentation was a total of 38,9 months. Most patients treated medically (34%) had chronic kidney disease lasting 13 to 24 months. In contrast, the majority of hemodialysis patients have chronic kidney disease lasting 25 to 36 months. All statistics on the duration of CKD are supported by Luqman *et al*.16.

In our study, pruritus (34%) was the most important skin manifestation in non-hemodialysis patients while xerosis (70%) was commonly observed in hemodialysis patients. Xerosis may be attributed to reduced eccrine sweat gland size, high diuretic regimens, and hypervitaminosis A [6]. Xerosis worsens in some patients, improves in a few, and does not change in many patients. Previous studies by Sultan *et al* and Kolla *et al*. reported xerosis of 54% and 51.7%, respectively, which are slightly lower than our results [15, 17]. Meanwhile, our results are supported by the findings of Thomas EA *et al*. 29 and Khanna D *et al*. 28. On the other hand, Uday Kumar *et al*.2 confirmed that xerosis was more common in hemodialysis patients than in our patients.

In our study, perforation disorder was evident in 10% of dialysis patients while no nondialysis patients had this feature. Our results are consistent with those of P.K. Koll *et al*.30 The skin is more susceptible to infection in cases of CKD despite its barrier function. We observed 12% and 18% of infections in non-dialysis and hemodialysis patients. Most of them are caused by tinea, tinea versicolor, and candidiasis as well as diaper rash. A decrease in the number of thyphecyls causes an increased incidence of fungal infections. Our results are almost similar to those of Asokans *et al*. observation [18]. Furthermore, other findings such as boils, cellulitis, herpes, and common warts were also supported by similar previous research [19]. Mucosal changes are not very uncommon in CKD patients and they may be due to dehydration, mouth breathing, high concentration of urea, and failure to break down to ammonia. We have observed 6% and 8% mucosal changes among undialysed and dialysed CKD patients respectively. Among all our cutaneous manifestations only xerosis, hair changes, and pigmentation frequencies between undialysed and dialysed CKD patients show statistically significant differences (p =<0.05) that are agreed by a previous study [20].

Conclusion

Xerosis, pruritus, and hyperpigmentation are skin manifestations commonly seen in CKD patients on hemodialysis, whereas pruritus and xerosis are more common in CKD patients receiving medical treatment.

Recommendations

We propose a multicenter study in secondary/tertiary hospitals across Bangladesh. Study time must be long. Also, a multidisciplinary approach to research work can make a study more precise and authentic in this respect.

Limitation

As this was a cross-sectional study, it was single-blinded and, due to time constraints, it was a single-center study. Furthermore, the sample size is small and does not reflect the general situation of the whole country.

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