Section: Urology

Original Research Article

PREVALENCE OF CUTANEOUS MANIFESTATIONS OF CHRONIC KIDNEY DISEASE

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Received : 20/07/2023
Received in revised form : 28/08/2023
Accepted : 09/09/2023

Keywords:
Haemodialysis, Pruritus, Renal, Xerosis.

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DOI: 10.47009/jamp.2023.5.5.167

Source of Support: Nil,
Conflict of Interest: None

Int J Acad Med Pharm
2023; 5(5); 862-866

Abstract

Background: The aim of this study is to evaluate the prevalence of various cutaneous manifestations in patients with chronic kidney disease (CKD) and undergoing haemodialysis. **Materials and Methods:** A total of 120subjects with CKD of diverse etiology who were undergoing haemodialysis were examined for cutaneous changes. **Result:** A total of 90 patients reported dermatological problems. However, upon examination, all patients had at least one cutaneous manifestation attributed to CKD. The most common cutaneous finding was xerosis in 74 cases, followed by pruritus in 70 cases, pallor in 56 cases, pigmentary changes in 28 cases, pedal edema in 24 cases, acquired perforating dermatoses in 6 cases, gynecomastia in 6 cases, purpura in 2 case, fungal infection in 46 cases, bacterial infection in 20 cases, and viral infection in 16 cases. Nail changes were noted in 82 cases, hair changes in 30 cases, and oral mucosal changes in 62 cases. **Conclusion:** Chronic kidney disease is associated with a complex array of cutaneous manifestations, either due to the disease itself or as a result of haemodialysis. Early recognition of cutaneous signs can alleviate suffering and decrease morbidity.

INTRODUCTION

Chronic kidney disease (CKD) is characterized by the presence of kidney damage, which is indicated by abnormal albumin excretion or decreased kidney function that persists for more than three months.[1,2]The effects of CKD are multifaceted and can result in dysfunction of multiple organs, including the skin.[3] Research has shown that between 50-100% of patients with end-stage renal disease exhibit at least one associated cutaneous change.[4]These manifestations can be observed from the onset of the disease to the progression to the terminal stage and/or after initiation of dialysis. Recent advancements in the treatment of CKD have improved the quality of life and life expectancy of these patients, leading to changes in the frequency and types of disorders.[5] Patients undergoing hemodialysis are particularly susceptible to mucocutaneous changes due to several contributory factors, including uremia, metabolic disorders, dialysis, and side effects of immunosuppressive drugs.[6]The aim of this study is to evaluate the prevalence of various dermatoses in patients with CKD undergoing haemodialysis.

MATERIALS AND METHODS

This prospective, multi-centric, cross-sectional, descriptive study was conducted in the department of Dermatology and Urology, at Jawahar Lal Nehru Medical College and Hospital, Bhagalpur, Bihar and Narayan Medical College and Hospital, Sasaram, Bihar. The study was approved by the institutional research and ethical committee. This study was conducted over a period of 12 Months from July 2021 to July 2022. An informed and written consent was obtained from all the participating subjects prior to the commencement of the study.

The study examined cutaneous manifestations in sixty patients with CKD of diverse etiology.

Inclusion criteria for this study were patients who were undergoing haemodialysis at our Institute. Exclusion criteria included patients who were undergoing haemodialysis following renal failure or peritoneal dialysis.

The procedure involved taking a comprehensive medical history, which included age, sex, underlying cause, duration of CKD, treatment history, dialysis, nature of onset and progression of skin lesions, past history of any skin disease, and history of any associated comorbid conditions. A detailed

ISSN (O): 2687-5365; ISSN (P): 2753-6556

cutaneous examination was performed in all patients, which included morphology, site and distribution of skin lesions, nail changes, and mucosal changes. Routine blood investigations for monitoring renal functions were also recorded. Specific investigations, such as skin biopsy, Gram's stain, bacterial culture, potassium hydroxide mount, and fungal culture, were conducted wherever indicated.

RESULTS

The study comprised a total of 60 patients, with 34 being male and 26 being female. The age range of the patients was between 16 and 72 years. The majority of the patients fell within the age bracket of 61-70 years, as indicated in [Table 1].

Table 1: Age and sex distribution of study subjects

Age in years	No. of patients	Male	Female
1-10	0	0	0
11-20	2	2	0
21-30	6	4	2
31-40	8	4	4
41-50	30	12	18
51-60	26	18	8
61-70	34	20	14
71-80	14	4	6
Total	120	68	52

The prevalence of diabetic nephropathy was found to be the primary etiology of chronic kidney disease (CKD) in the study population. Additional causes of CKD within the cohort are delineated in [Table 2].

Table 2: Etiology of chronic kidney disease in the study subjects

Etiology chronic kidneydisease	No. of patients
Diabetic nephropathy	56
Chronic tubule interstitial nephritis	20
Chronic glomerulo nephritis	18
Nephrotic syndrome	8
Hypertensive nephro sclerosis	6
IgA nephropathy	4
Lupus nephritis	4
Autosomal dominant polycystic kidney disease	2
Ischemic renal failure	2

[Table 3] displays a range of cutaneous, nail, hair, and mucosal changes observed in the subjects under study.

Table 3: Various cutaneous manifestations in the study group

Clinical manifestation		Number of subjects
Skin	Xerosis	74
	Pruritus	70
	Pallor	56
	Pigmentary changes	28
	Acquired perforating	6
	Gynecomastia	6
	Purpura and ecchymosis	2
	Bacterial infection	20
	Funga linfection	46
	Viral infection	16
Nail changes	Koilonychia	28
	Half and half nail	16
	Nail dystrophy	12
	Onycholysis	12
	Subungual hyperkeratosis	12
	Beau'slines	10
	Leukonychia	6
	Pitting	4
	Clubbing	4
	Splinter hemorrhage	4
Oral mucosal changes	Glossitis	20
	Chelitis	14
	Pigmentation of oral mucosa	16
	Xerostomia	12
	Macroglossia	2
Hair changes	Dry lusterless hair	20
	Sparse body hair	8
	Diffuse alopecia	6

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

Approximately all of patients diagnosed with chronic kidney disease (CKD) exhibit at least one skin lesion, which may occur before or after dialysis initiation and can serve as an initial clinical indicator of kidney disease.[3] Specific and nonspecific cutaneous and mucosal changes are associated with renal disease, including acquired perforating dermatoses, bullous dermatoses, metastatic calcification, and nephrogenic systemic fibrosis, as well as xerosis, pruritus, pallor, and pigmentary changes.[5]

This study included 120 patients with CKD undergoing haemodialysis, of whom 90 presented with skin problems. However, all patients exhibited at least one cutaneous manifestation attributable to CKD upon clinical examination. The majority of patients were between the ages of 61 and 70, with a male to female ratio of 1.3:1, consistent with previous studies by Udayakumar et al,[7] and Thomas et al.[5]

In our study, diabetic nephropathy accounted for the highest proportion, 56 subjects of chronic kidney disease (CKD), followed by chronic tubule interstitial nephritis 20 subjects and chronic glomerulonephritis 18 subjects. This finding is consistent with Thomas et al. study, which also identified diabetic nephropathy as the leading cause of CKD.[5]

In our study, xerosis of the skin was the predominant cutaneous finding. This condition has been reported to affect a significant proportion of patients on maintenance dialysis, ranging from half to three quarter subjects.[8,9] Among the 74 patients in our study, 61.7% exhibited generalized xerosis, while 20 patients had localized xerosis. The causes of xerosis in CKD patients include reduced sweat, elevated plasma vitamin A, alkalinity of skin, use of diuretics, and malnutrition.[10] Notably, Bencini et al. reported a significant increase in the incidence of xerosis in patients undergoing hemodialysis.[11] The incidence of xerosis in various studies ranged from 66% to 86%.[5,10,12-16]

Pruritus was the second most common cutaneous finding in our study, affecting 58.3% subjects. Most patients had generalized pruritus, while only 16 had localized pruritus. Notably, 30 patients with xerosis also had associated pruritus. Deshmuk et al,[10] reported pruritus in 65.7% of patients, while Falodun et al,[15] noted it in 26.7% of patients. Masmoudi et al. found that 63% of patients with pruritus had xerosis.[4]

The manifestation of pallor in the skin is a common occurrence in patients with chronic kidney disease (CKD),[7] often indicative of anemia. This was observed in 46.6% of patients, whose hemoglobin levels ranged from 6-11gm/dl. Contributing factors to anemia may include deficient erythropoietin production, dietary deficiencies of iron, folic acid, and vitamin B12, as well as hypo-responsiveness to erythropoietin.[16] In comparison to the Udayakumar et al,[10] Pigmentary changes were observed in 28 patients, with diffuse hyperpigmentation over sun-exposed areas noted in 24 patients.[17-19] This finding is consistent with the study conducted by Pico et al.[20]Udayakumar et al. reported a higher incidence of diffuse hyperpigmentation and prominent pigmentation over sun-exposed areas in their study.[7]The diffuse hyperpigmentation of the skin is attributed to an increase in melanin in the basal layer of the epidermis and superficial dermis, which is caused by the failure of the kidney to excrete beta-melanocyte-stimulating hormone.[17]

In our research, a yellowish tinge to the skin was observed in 4 patients, representing a prevalence of 3.3%. This finding is consistent with the work of Udaykumar et al., who reported a higher prevalence in their patient population. The yellowish hue is attributed to the accumulation of carotenoids and nitrogenous pigments, specifically urochromes, in the dermis and subcutaneous tissue.[18,19] The lower prevalence of this finding in our study may be attributed to the darker complexion of our patient population.

Acquired perforating dermatoses (APD) were observed in 6 patients with chronic kidney disease, specifically Kyrle's disease, as confirmed by histopathology. These patients presented with pruritic keratotic papules with central keratin-filled craters, primarily on the extensor aspect of their extremities and trunk. Trauma from scratching was identified as a major trigger for the development of APD. Additionally, all three patients had severe generalized pruritus, which may have served as a triggering factor for APD. Our study found that all three patients with APD also had type 2 diabetes mellitus, which is consistent with previous research by Kim et al,[21] and Morton et al,[22] who reported an increased association of diabetes in chronic renal failure patients with APD. Dermal microvasculopathy related to diabetes is a predisposing factor for APD, as it induces a hypoxic state in which trauma from scratching causes dermal necrosis.[23]The prevalence of APD was reported to be 17.4% in Deshmukh et al.'s study, 21% in Udayakumar et al.'s study, and 5.2% in Masmoudi et al.'s study.

Gynecomastia is a potential consequence of suppressed pituitary gland and gonadal function resulting from chronic kidney disease and associated malnutrition. Upon haemodialysis and resumption of a proper diet, there may be an increase in the excretion of gonadotrophin and estrogen hormones, leading to transient gynecomastia.[24] Our study observed gynecomastia in 6 patients, while Udayakumar et al. noted it in 1% of their patients.

Abnormal bleeding in CKD patients is primarily caused by defects in primary hemostasis, such as increased vascular fragility, abnormal platelet function, and the use of heparin during dialysis.[25]In our study, purpura was observed in 2 patient.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Udayakumar et al. and Sanad et al. noted it in 9% and 32% of their cases, respectively.[7,14]

Cutaneous infections are more prevalent among patients with CKD,[26] likely due to various factors such as depressed neutrophil function, impaired phagocytosis, decreased T and B lymphocyte function, and reduced natural killer cell activity.[27] Studies by Deshmukh et al. and Udayakumar et al. reported cutaneous infections in 34.2% and 40% of cases, respectively. Fungal infections were the most common type of infection observed, with bacterial and viral infections also noted. The high incidence of fungal infections may be attributed to low socio-economic status and hot humid climates in certain regions.

Nail changes were also frequently observed in CKD patients, with koilonychia being the most common finding, followed by half and half nail, nail dystrophy, onycholysis, and subungual hyperkeratosis.[28-29] Other nail changes observed included Beau's line, leukonychia, pitting, clubbing, and splinter hemorrhage. The etiology for band-like discoloration in half and half nail is proposed to be increased nail bed capillary density and stimulation of nail melanocytes by increased levels of plasma melanotrophic hormone.[29] Beau's lines,[30] which result from temporary cessation of nail growth in the matrix due to illness, were observed in 5% of cases.[31] Pitting and onycholysis were also noted in a small percentage of cases.

Hair changes were observed in 30 patients. Previous studies by Deshmukhet al,[10] and Masmoudiet al,[4] reported comparable changes in hair of patients. The hair changes noted in our study included dry, lusterless hair in 20 patients, sparse body hair in 8 patients, and diffuse hair loss in 6 patients. Two patients exhibited more than one hair change. Dry and lusterless hair is attributed to decreased secretion of sebum, as reported in Udayakumar et al. study, which also noted sparse body hair in 8 cases and diffuse alopecia of the scalp in 6 cases.[7]

Oral mucosal changes were noted in 64 patients. Masmoudi et al. reported oral mucosal changes in lesser number of cases. Glossitis was the most common finding in 20 subjects, followed by pigmentation of oral mucosa in 16 subjects, cheilitisin 14 subjects, xerostomia 12, and macroglossiain 2 subjects. Nutritional deficiencies, such as riboflavin deficiency, iron deficiency anemia, and zinc deficiency, may contribute to the occurrence of glossitis and cheilitis. Teeth indentation with macroglossia was first reported by Mathew et al. Udayakumar et al. and Sanad et al. reported macroglossia in 35% and 43% of cases, respectively. However, the prevalence of macroglossia has decreased in recent years due to more effective treatment of CKD.[32] Xerostomia in CKD patients may be due to dehydration and mouth breathing, and was noted in 12 patients in our study. Sanad et al. and Udayakumar et al. reported xerostomia in 46% and 31% of cases, respectively. CKD patients may present with various cutaneous manifestations, some of which may suggest the presence of a serious systemic disorder. An interdisciplinary management involving dermatologists and nephrologists is essential for better outcomes and improved quality of life for patients.

CONCLUSION

Cutaneous manifestations are frequently observed in patients with chronic kidney disease. It is advisable to consider the possibility of renal function abnormalities in patients exhibiting such symptoms and to conduct a thorough evaluation.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556