HSI Health Sciences Investigations Journal

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ISSN Online 2704-4890 | ISSN Print 2720-7609

Online first publication

Original Research Article

HSI Journal (2024) Volume 6 (Issue 1): 762-768. https://doi.org/10.46829/hsijournal.2024.7.6.1.762-768

Open Access

Dermatological manifestations among patients with chronic kidney disease attending the renal clinic and dialysis unit of a tertiary hospital in Ghana

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Received February 2024; Revised April 2024; Accepted June 2024

Abstract

Background: Cutaneous manifestations occurring in patients with chronic kidney disease (CKD) can indicate systemic problems such as metabolic abnormalities that have significant morbidity and mortality risks. Most studies on this subject have involved patients with end-stage kidney disease (ESKD) with skin manifestations.

Objective: The study aimed to determine the prevalence of dermatological manifestations amongst persons with CKD attending the Korle-Bu Teaching Hospital as compared with the prevalence in non-renal patients.

Methods: A cross-sectional study was used to determine the prevalence of skin diseases among chronic kidney disease (CKD) (renal) and non-renal patients from January 2016 to June 2016. Each patient was assessed using a full medical history, physical examination and a full dermatological examination of skin, nails, and hair. Data was entered into Epi info and analysed with SPSS Version 18. Descriptive statistics was used in the analysis.

Results: The prevalence of dermatological disorders was 95.2% in the renal patients compared to only 5.6% in the non-renal patients. The most common mucocutaneous disorder in renal patients was pallor (72.4%, n = 105), followed by xerosis (58.1%, n = 86), then pruritus (22.1%, n = 32). The most common nail disorder was half and half nails (66.3%, n = 55), followed by brown nails (10.8%, n = 32) and onycholysis (9.6%, n = 8). The most common hair abnormality was sparse scalp hair loss (44.4%, n = 16), sparse body hair loss (33.3%, n = 12), and diffuse scalp hair loss (13.9%, n = 5).

Conclusion: The prevalence of skin disorders was higher in CKD patients than in patients without renal disease. Dermatological manifestations are an important component of CKD symptomatology, and healthcare providers should aim to recognise, diagnose, and manage them to improve patient outcomes.

Keywords: Chronic kidney disease, renal dysfunction, dialysis, dermatological manifestations.

Cite the publication as Seadey MY, Boima V, Nuamah MA, Lartey M (2024) Dermatological manifestations amongst patients with chronic kidney disease attending the renal clinic and dialysis unit of a tertiary hospital in Ghana. HSI Journal 6 (1):762-768. https://doi.org/10.46829/hsijournal.2024.7.6.1.762-768

INTRODUCTION

Chronic kidney disease (CKD) is a pathophysiologic condition that results in a decrease in quantitative and qualitative activities of the nephrons, subsequently leading to end-stage kidney disease (ESKD) [1]. CKD is defined as either kidney damage or glomerular filtration rate (GFR) less than 60 ml/min/1.73 m^2 for greater than three months, where kidney damage refers to pathologic abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies [2-4]. The effects of CKD are varied and complex. Notably, uraemia may manifest as a dysfunction of multiple organs, including the mucocutaneous tissues, hair, and nails [5]. In addition, conditions associated with renal replacement therapy are fraught with numerous and often relatively unique cutaneous disorders. Skin diseases may coincidently co-exist with other medical illnesses or be specific markers or manifestations of underlying systemic disease. Some of these systemic diseases that can be suspected through

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cutaneous manifestations include CKD, endocrine disorders such as thyrotoxicosis, lymphomas, nutritional deficiencies, and HIV/AIDS [6].

A wide variety of skin diseases occur in CKD patients. With an almost 100% prevalence in the dialysis population, skin disorders are frequently the subject of patient complaints [7-9]. In a study by Pico et al., all CKD patients had at least one or more dermatological manifestations, while another study noticed skin changes in 79% of CKD patients. Malkud et al. and Sultan et al. observed that 50% - 100% of CKD patients had at least one skin manifestation [9,10]. In addition, a study by Falodun et al. quoted the prevalence of skin diseases in CKD as 89.1% [11]. The significant risk factor for these skin diseases in the CKD population is underlying renal disease. Skin disorders have a considerable negative effect on a patient's quality of life [12-14]. Such skin problems can induce serious discomfort, anxiety, depression and sleeping disorders and have an overall negative effect on the mental and physical well-being of such patients [3,15,16]. Treatment of skin diseases is based on the type of skin disease, its pathophysiology and degree of skin involvement. Although the majority of skin disorders seen in CKD are relatively benign, a few rare ones have the potential to cause serious morbidity and mortality. Early recognition of these dermatological manifestations of CKD and prompt treatment can dramatically alter the clinical course, prolong life and even save the lives of such patients [12,17,18].

There is currently a paucity of information on dermatological manifestations of CKD in West Africa and Ghanaian patients, in particular with CKD [11,19]. Although patients visiting kidney disease clinics report dermatological disorders, the conditions have not been related to CKD. The aim of the study was to determine the prevalence of dermatological manifestations amongst persons with CKD attending the Korle-Bu Teaching Hospital as compared with the prevalence in non-renal patients.

MATERIALS AND METHODS

Study design and sites

The research was a hospital-based cross-sectional study that included renal patients at the renal clinic and dialysis units and non-renal patients at the orthopaedics outpatients of the Korle Bu Teaching Hospital in Accra from January 2016 to June 2016.

Sample size and sampling technique

Non-renal patients were included in the study to compare the prevalence of skin diseases in the two groups. A renal patient is defined as having CKD if there is evidence in medical records of a clinical diagnosis of CKD and an eGFR of less than 60 ml/min/1.73 m^2 over the last three months with or without sonographic evidence of pathologic kidney anatomy (i.e., shrunken echogenic kidneys or polycystic kidney disease). All chronic kidney disease patients on maintenance haemodialysis at the Korle-Bu Teaching Hospital and aged at least 18 years during the study period were eligible for inclusion in the study. Patients with dermatological disorders which were secondary to other systemic conditions such as diabetes or connective tissue diseases and not directly or indirectly due to CKD and patients with dermatological disorders prior to the diagnosis of chronic kidney disease were excluded. Two independent skin specialists assessed any existing dermatological disorders, and an agreement of both findings was used to exclude patients with skin disorders attributed to other chronic conditions aside from kidney disease. In circumstances where there was a disagreement between the two specialists, a senior/consultant specialist was consulted to make a final decision on whether to include or exclude the patient in context.

Using a reported prevalence of skin disorders in CKD of 89.1%, as stated in a study by Falodun et al. [11], the sample size of one hundred and forty-five (145) was obtained using the Cochrane formula [8]. Participants were sampled consecutively from the dialysis unit, renal outpatient clinic, and medical inpatient wards until the sample size was obtained. An average of 10 patients were recruited weekly from each site.

Research Instrument

A standardised questionnaire was used to collect data on sociodemographic (age, sex, occupation), clinical characteristics (duration of CKD diagnosis, eGFR, duration on haemodialysis) and physical skin examination findings of the study participants. Data on eGFR was obtained from the medical records of the patient, whilst data on the start of dialysis and duration of hemodialysis collaborated with a records book kept at the dialysis unit, which contained the date of starting dialysis and for how long an individual has been on haemodialysis. The same eGFR equation was used in both renal and non-renal cases. Questionnaires were administered by trained research assistants.

The non-renal patients for the study were patients attending the orthopaedic trauma outpatient clinic during the study period, aged 18 years and above for both sexes, with no underlying chronic systemic disease, including CKD (patients with eGFR > 89 ml/min/1.73 m^2). The selection of non-renal patients was done by consecutive sampling over the study period. These non-renal patients were taken through pre and post-test counselling on recruitment days before screening for Hepatitis B, C and HIV using rapid diagnostic test (RDT) kits, as these are routine tests for patients with CKD. The results of the participants' tests were discussed with them. Blood samples were also taken to determine eGFR. Participants were then examined for any dermatological disorder in a secure consulting room with an attendant chaperone. Skin biopsy, culture and sensitivity for bacterial infections, gram stain, potassium hydroxide mount and fungal culture were done to confirm the diagnosis in doubtful situations.

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Data Analysis

Data was entered into the Statistical Package for Social Sciences SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0 Chicago: SPSS Inc. for analysis using mainly descriptive statistics.

RESULTS

One hundred and forty-five patients from the renal clinic and dialysis units were included, and 148 non-renal patients were screened from the orthopaedic outpatient unit. Two patients were hepatitis B positive, and one was HIV positive. Therefore, the three were excluded from the study. The socio-demographics of the renal and non-renal patients were not significantly different. However, the majority (41.7%, n = 61) of the renal patients were unemployed, compared to the 20.7% (n = 30) of non-renal patients (p = 0. 000) (Table 1). The mean (± standard deviation) age among patients with CKD was 48.2 ± 15.5 years, and that among non-renal patients was 52.2 ± 16.9 years. Regarding the duration of CKD from the time of diagnosis, 38.2% (n = 55) had the condition between zero to six months, 28.5% (n = 41) were between 6 - 12 months, 10.4% (n = 15) were between 1 – 2 years, 9% (n = 13) between 2 - 3 years, 7.6% (n = 11) between 3 to 5 years, 4.2% (n = 6) between 5 to 10 years and 2.1% (n = 3) had had duration of CKD from the time of diagnosis being greater than ten years. A greater proportion of the renal patients (57.3%, n = 83) were on haemodialysis, and 72.3% (n = 105) had been on haemodialysis between zero and one year (Figure 1). Each patient had at least one complaint. The commonest complaint was bipedal oedema (50.7%, n = 74). Palpitations and easy fatigability followed this with 41.9% (n = 61) and 41.2% (n = 60) respectively (Figure 2). The majority of the patients had more than one associated risk

Table 1. Socio demographic characteristics of study participants

Characteristics	Renal patients n(%)	Non-renal patients n(%)
Age ranges (years)	18-83	18-82
Gender		
Male	83 (57.2)	59 (40.7)
Female	62 (42.8)	86 (59.3)
Nationality		
Ghanaian	136 (93.8)	143 (98.6)
Non-Ghanaian	9 (6.2)	2 (1.4)
Ethnicity		
Ga/Dangme	26 (18.4)	46 (31.7)
Ewe	35(24.8)	34 (23.4)
Akan	60 (42.6)	50 (34.5)
Hausa	18 (12.8)	12 (8.3)
Others	2 (14)	3 (2.1)
Educational Background		
None	5 (3.5)	5 (3.5)
Primary	7 (4.9)	22 (15.2)
Middle school/JSH	66 (46.2)	73 (50.3)
SHS	38 (26.6)	35 (24.1)
Tertiary	26 (18.2)	10 (6.9)
Post-graduate	1 (0.7)	
Religion		
Christian	128 (88.3)	105 (72.4)
Muslim	16 (11)	30 (20.7)
Others	1 (0.7)	10 (6.9)
Marital Status		
Married	95 (67.4)	80 (55.2)
Single	34 (24.1)	38 (26.2)
Divorced	3 (2.1)	13 (8.9)
Separated	8 (5.7)	10 (6.9)
Others	1(0.7)	4 (2.8)
Employment status		
Employee	22(15.8)	70 (48.3)
Private formal	9 (6.5)	20 (13.8)
Self employed	50 (30.6)	25 (17.2)
Unemployed	58 (41.7)	30 (20.7)

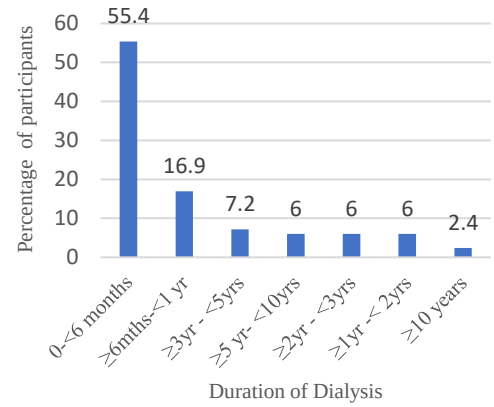

Figure 1. Duration of haemodialysis

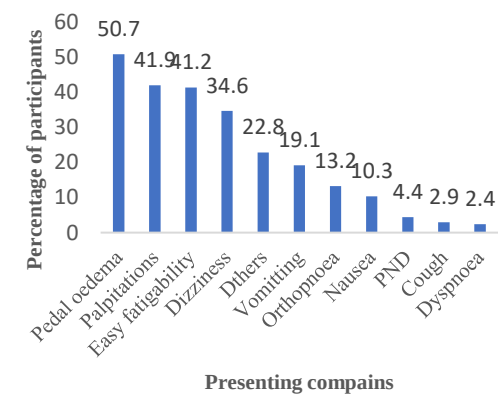

Figure 2. Complaints of renal patients. PND: paroxysmal nocturnal dyspnea.

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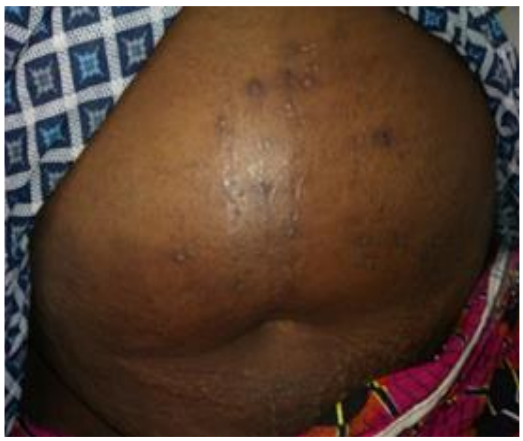
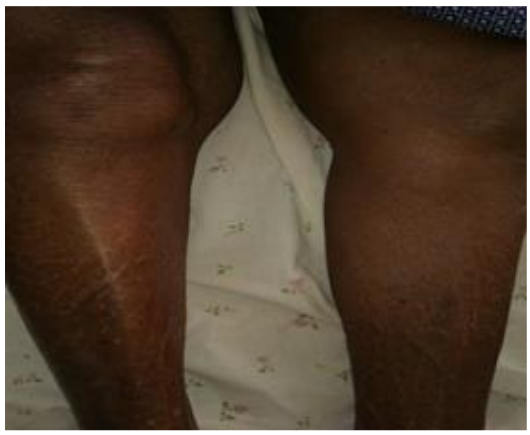
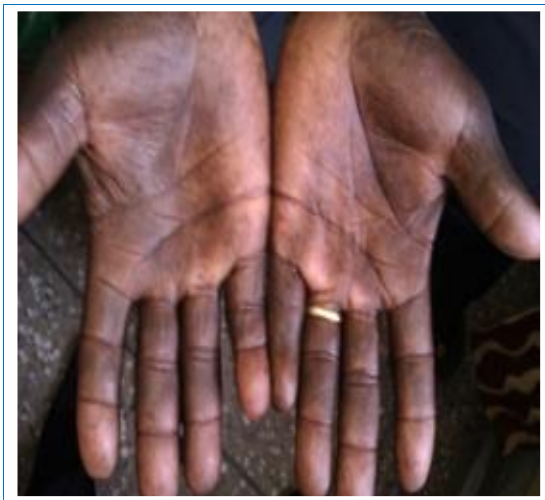


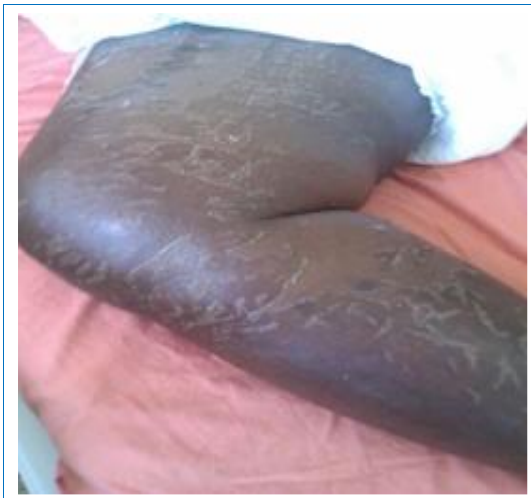
A. Pruritus with excoriation marks



B. Xerosis with ichthyosiform changes



C. Hyperpigmentation of the palms



D. Scaling of the limb

Figure 3. Mucocutaneous presentations of renal diseases

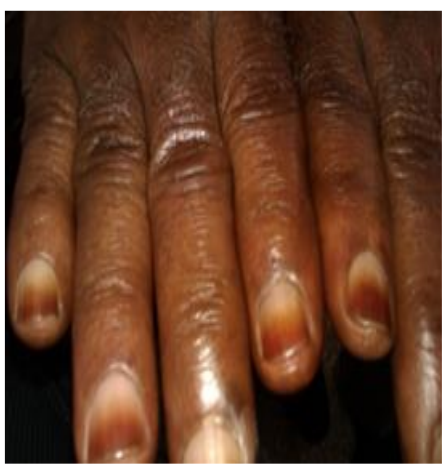


Figure 4. Lindsay's half and half nails

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factor; Hypertension was the most common risk factor, accounting for 83.2% (n = 121), followed by diabetes, accounting for 31.4% (n = 45). Mucocutaneous presentations were the predominant dermatological complications (Figure 3).

About 95.2% (n = 138) of the study participants exhibited at least one of the mucocutaneous presentations. Pallor, xerosis and pruritus were the most presenting manifestations (Table 2). A smaller proportion of 25.5% (n = 37), had at least one hair manifestation suggestive of CKD: 43.2% (n = 16) patients had sparse scalp hair, 32.4% (n = 12) had sparse body hair, 13.5% (n = 5) had diffuse scalp hair, 8.1% (n = 3) had dry lusterless hair and 2.7% (n = 1) had dandruff. The majority of the dermatological manifestations were observed among patients with ESKD (eGFR < 15 ml/min/1.73 m^2). Comparatively, only 5.6% (n = 8) of the non-renal study participants had dermatological manifestations, and these included three patients with Acne Vulgaris, two with Pityriasis Versicolor, and one each having scabies, Tinea cruris, and Paederus dermatitis.

Table 2. Distribution of dermatological conditions among case group

Mucocutaneous complications	Frequency (n = 145)	Percentage (%)
Pallor	105	72.4
Xerosis	86	58.1
Pruritus	32	22.1
Hyperpigmentation	29	20,0
Scaling	29	20.0
Ichthyosis	24	16.6
Excoriations	16	11.3
Seborrhoeic dermatitis	10	6.9
Planar warts	4	2.7
Coated tongue	3	2.1
Acne vulgaris	3	2.1
Jaundice	3	2.1
Uremic frost	2	1.4
Idiopathic guttate hypomelanosis	2	1.4
Pityriasis vesicolor	2	1.4
Petechiae	1	0.7
Ecchymosis	1	0.7
Bullous dermatosis	1	0.7
Xerostomia	1	0.7
Acneiform eruption	1	0.7
Bacterial folliculitis	1	0.7
Papular dermatosis	1	0.7
Plantar keratoderma	1	0.7
Pruritic papular eruption	1	0.7
Milaria crystalina	1	0.7
Tinea corporis	1	0.7

Table 3. Nail changes among case group

Nail changes	Frequency (n = 83)	Percentage (%)
Lindsay's half and half	55	66.3
Brown nail	9	10.8
Onycholysis	8	9.6
Sunungal hyperkeratosis	7	8.4
Leukonychia	4	4.8
Mees's lines	3	3.6
Clubbing	3	3.6
Koilonychia	2	2.4
Beau lines	1	1.2

DISCUSSION

The effects of CKD are varied, and patients with CKD present with various dermatological manifestations. In the current study, 95.2% of the 145 renal patients had at least one mucocutaneous lesion as compared to 5.6% (n = 8) of non-renal patients at the KBTH. This is comparable with a study by Khanna et al. in which 96% of CKD patients had at least one dermatological manifestation [20]. Some studies have reported that all CKD patients had at least one or more dermatological manifestations [7,21], while Bencini et al. [22] noticed skin changes in 79% of CKD patients. In this study, there were 57.2% (n = 83) males. This is similar to findings from other studies that reported 66%, 72% and 65.3% of their study participants to be male [5,23,24]. These studies show a male predominance that might reflect the fact that risk factors for CKD, such as hypertension and smoking, are commoner in males [24]. Differences in health-seeking behaviours of males and females might also play a role in the observed differences as women usually seek medical help earlier and could manage risk factors to mitigate the development of the disease or its complications.

Duration of CKD from the time of diagnosis ranged from one day to over ten years. The majority of patients, 38.2%, were diagnosed within the six months of the study period. A study reported that the duration of CKD ranged from 3 to 60 months [24]. Patients with a longer duration of CKD are more likely to have complications of CKD, including cutaneous manifestations [9]. Over half (57.3%, n = 83) of the present study participants were on maintenance haemodialysis. The majority (55.4%, n = 80) had been on haemodialysis for six months or less, and about 2.4% (n = 3) were on haemodialysis for over ten years. In the study by Sultan [10], the total duration of haemodialysis ranged from 0.08 - 20 years, meaning patients in question were on haemodialysis for a much longer period. Patients on haemodialysis are known to develop cutaneous manifestations ranging from infections to malignancies [9]. Masmoudi et al. [17] and Headley et al. [25] also found that prolonged hemodialysis was associated with cutaneous changes. All the present study participants had at least one complaint. The most common complaint was bipedal oedema [50.7%], which was lower than the 88.7% reported by Amoako et al. in Kumasi, Ghana [26]. The reason for the differences observed is unclear and may be due to the differences in patient management in the two centres and

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the geographical location of the two regional capitals. One is coastal, and the other is hinterland, but the population is expected to be similar in the same country. Further research is needed to clarify the difference. Pallor was the most common physical finding, accounting for 76.1% (n = 110). In a study by Sultan et al., 45% of CKD patients had pallor [10]. Also, in a study by Falodun et al., only 2.5% had pallor [11]. These figures suggest our patients were more anaemic, and we conjecture that nutritional deficiency of iron, hookworm infestation, and the disease process could probably explain this.

Xerosis was the most common mucocutaneous manifestation, accounting for 58.1% (n = 84), followed by pruritus at 22.1% (n = 32), hyperpigmentation and scaling accounting for 20% (n = 29), and ichthyosis at 16.6% (n = 24). In a study by Udayakumar et al. [28], 79% of CRF patients on chronic hemodialysis had xerosis. Also, in a study by Khanna et al. [20], 72% of cases had xerosis as the most common complaint, while Sultan et al. [10] reported xerosis in 54% of patients. The differences may be due to climatic conditions prevailing in these countries, hydration of the skin, duration of haemodialysis, and individual skin physiology.

Hypertension was the most common risk factor, accounting for 83.2% (n = 121), followed by diabetes, accounting for 31.4% (n = 45), and then chronic glomerulonephritis (7.3%, n = 11). This was comparable to a study by Sultan et al. [10] in which hypertension was the commonest risk factor, accounting for 60%, followed by diabetes (14%) and then obstructive uropathy (7%). However, in a study by Khanna et al. [20], chronic glomerulonephritis (45%) was the most common risk factor, followed by diabetic Nephropathy (22%), then hypertension (12%). Also, Khan R et al. reported hypertension as the second most common risk factor for CKD [21]. Hypertension is recognised as an important cause of chronic renal failure in outpatients as well as in inpatients in Africa [22,23]. In a 6-year study of 3632 patients with ESRD, based on South African dialysis and transplant registry statistics, hypertension was reported to be the cause of ESRD in 4.3% of White people, 34.6% of Black people, 20.9% of mixed ethnic groups and 13.8% of Indians [29]. The differences in variability of risk factors could probably be explained by the geographic locations in which the studies were conducted. Also, ethnicity seems to play a major role in hypertension.

Our study had a few limitations, such as the majority of patients were on haemodialysis for about a year, which was not a long enough period to observe all dermatological manifestations. Secondly, previous treatment for skin conditions was not taken into account as these could have been dermatological manifestations of CKD. However, our study compares with studies done elsewhere, confirms previous results, and establishes new findings. The biochemical markers of the stages of the diseases and the progression of the skin manifestation are the focus of our subsequent study.

Conclusion

This study has established that cutaneous lesions are a common presentation amongst patients with CKD, as 95.2% (n = 138) of the renal patients had at least one dermatological manifestation. The majority of dermatological manifestations were prevalent amongst stage 5 (eGFR < 15 ml/min/1.73 m^2) kidney disease patients. Patients with ESRD may present with an array of skin abnormalities that need to be diagnosed and managed appropriately.

DECLARATIONS

Ethical consideration

The study protocol was approved by the Ethical and Protocol Review Committee of the College of Health Sciences, University of Ghana. Protocol Identification CHS-Et/M:8-p4.12014-2015. Written informed consent was obtained from all study participants.

Consent to publish

All authors agreed on the content of the final paper.

Funding

None

Competing Interest

The authors declare no conflict of interest

Author contributionS

All authors contributed equally to the study conceptualisation, design, data collection, analysis, drafting and finalisation of the manuscript.

Acknowledgement

The authors wish to thank Mr. Michael Mensah (Research, Family Health Medical School) for his technical assistance.

Availability of data

Data is available upon request to the corresponding author

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