

Cutaneous Findings In Hemodialysis Patients, A Cross- Sectional Study

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Abstract

Background: Patients with end-stage renal disease (ESRD) have a wide range of skin manifestations, ranging from benign conditions, such as xerosis, pruritus, color changes, and half-and-half nails, to life-threatening calciphylaxis. Comprehensive knowledge of the various changes in appropriate symptomatic relief is imperative in these patients' management process. Thus, we assessed the pattern of cutaneous comorbidities among patients with ESRD undergoing hemodialysis.

Methods: A descriptive hospital-based cross-sectional study was conducted at the dialysis center of Jerash Governmental Hospital, Jerash, Jordan, from August 2022 to September 2022. A total of 158 patients with ESRD of adult age and gender were included in our study.

Results: Out of the 158 participants, 80 (50.6%) were male, and 78 (49.4%) were female. The leading cause of ESRD was hypertension in 77 participants (48.7%), followed by diabetes mellitus in 36 patients (22.8%). Among the participants, the two most common skin changes reported were skin dryness in 63 participants (39.87%), followed by uremic pruritus in 49 participants (31.01%). Hypertension was the most common cause of ESRD. Xerosis was the most common cutaneous comorbidity, followed by uremic pruritus and hyperpigmentation.

Conclusion: Hemodialysis patients can have various cutaneous comorbidities that have significant negative effects on their quality of life. Therefore, health professionals need to be aware of these manifestations so that they can advise patients on prophylactic measures to take to improve skin care and promptly recognize and treat serious skin conditions associated with hemodialysis, thus reducing morbidity and mortality.

Keywords: chronic kidney disease, dialysis, end-stage renal disease, renal failure, skin manifestations.

Abbreviations: APD: acquired perforating dermatosis, ESRD: end-stage renal disease, KOH: potassium hydroxide

1. Introduction

The skin is known as the largest organ of the human body, and it reflects the pathophysiological processes occurring internally within the body, including specific types of cancer, endocrinopathies, gastrointestinal diseases, and internal diseases such as chronic kidney disease (CKD) [1]. As the skin is regarded as a mirror of the internal organs, skin manifestations can help guide clinicians in their evaluation of patients and aid in the diagnosis process [2].

CKD is defined as progressive kidney damage or a glomerular filtration rate (GFR) < 60 mL/min/1.73 m² for three months or more. It is divided into five stages. Stage V, also known as end-stage renal disease (ESRD), is the body's

state that requires the initiation of renal replacement therapy [3]. In this stage, there is a progressive decline in glomerular function with kidney failure to maintain an average level of the waste products of metabolism (urea and creatinine) and electrolytes (sodium, calcium, and phosphate). Therefore, renal replacement therapy in the form of kidney transplantation surgery or dialysis has been the mainstay modality of treatment in such cases [4].

CKD is a growing public health issue globally. In Jordan, 719 patients were newly diagnosed with CKD in 2019 [5]. The effects of long-standing CKD are complex because the disease affects multiple organs. The skin is among the most commonly affected systems [1].

About 50%–100% of patients with ESRD have at least one associated skin change [6]. Skin changes in ESRD have a wide range of manifestations usually detected on hemodialysis, as these manifestations are rarely seen in the early stages of the disease. Therefore, a complete and precise skin examination is necessary for patients with ESRD on hemodialysis. These manifestations range from benign conditions, including xerosis (dryness), pruritus (itching), color changes, and half-and-half nails, to life-threatening calciphylaxis. Comprehensive knowledge of these various changes for appropriate symptomatic relief is imperative in these patients' management process [7].

The skin in ESRD is mainly affected by uremic syndrome, which results from the accumulation of hundreds of toxins in addition to urea, creatinine, and the underlying illness [6]. Although hemodialysis improves the life expectancy of ESRD patients, it can also aggravate skin conditions [8].

Both the disease and the hemodialysis can either cause or aggravate skin manifestations in ESRD patients. These skin manifestations can affect patients' quality of life. Therefore, early recognition and awareness of skin conditions by medical staff can be helpful in the treatment process. For this reason, our study aimed to analyze the prevalence of skin manifestations among adult patients with ESRD at the dialysis center of Jerash Governmental Hospital, Jordan.

2. Materials and Methods

2.1 Study design

This work is a descriptive, facility-based, cross-sectional study conducted at a dialysis center in Jordan from January 2021 to July 2021. The research was performed in accordance with the local IRB at King Abdullah University Hospital number (13-1-2284), all patients enrolled in the study have signed a consent form according to 1964 Helsinki Declaration. This paper was checked to meet all the STROCSS criteria [9].

2.2 Data collection

The data were collected through interviews. A complete dermatological history was obtained, and a detailed clinical assessment of the skin, hair, nails, and mucous membrane of the participants was performed by a dermatologist. Data on the chronic illnesses of all participants were obtained from their medical records after obtaining their informed consent. The diagnosis of dermatological manifestations was made based on clinical features and a thorough skin examination. A skin biopsy was taken to exclude other causes of skin dryness, such as psoriasis. Further examinations, such as a complete blood count and **potassium hydroxide** preparation and culture, were performed if infections were suspected.

2.3 Study population

According to the 12th annual report of a national registry of ESRD, 6,316 patients with ESRD received hemodialysis or peritoneal dialysis in hospitals. Among them, 4,145 were from the central region of Jordan, 1,563 were from the northern region, and 572 were from the southern region. A total of 176 ESRD patients attended the dialysis unit in Jerash Governmental Hospital in 2019 [5]. The sample size comprised patients 18 years old and above who attended Jerash Governmental Hospital's dialysis unit from January 2021 to July 2021.

2.4 Statistical analysis

In accordance with the study objectives, data were obtained from 158 patients suffering from ESRD who attended the hospital for a dialysis session during the study. The obtained data were entered into the Microsoft Office Excel program to be organized, coded, and checked for errors. Data analysis was carried out using the Statistical Package for the Social Sciences program version 25. The means and standard deviations (SD) were used for numerical (continuous) data, while percentages and frequencies were used for categorical data.

3. Results

3.1 Sociodemographic characteristics of the participants

Out of the 158 patients included in the study, 80 (50.6%) were male, and 78 (49.4%) were female. The majority of the participants fell under the age group of 58 years and above with 62 participants (39.24%), followed by the age groups of 38–47 years with 36 patients (22.78%), 48–57 years with 29 patients (18.35%), 28–37 years with 18 patients, and 18–27 years with 13 patients (Table 1).

3.2 Etiology of ESRD among the participants

The leading cause of ESRD was hypertension in 48.7% (77) of the participants, followed by diabetes mellitus in 22.8% (36), obstructive uropathy in 8.2% (13), drugs in 7% (11), and familial polycystic kidney disease and Behcet's disease in 0.6% (1). All causes of ESRD are presented in Table 2.

3.3 Prevalence of skin manifestations among the participants

The most common skin-related clinical finding reported was skin dryness in 39.87% (63 cases) of the participants, followed by excoriations due to itching in 31.01% (49 cases), hyperpigmentation in 5.7% (9 cases), prurigo in 3.6% (6 cases), onychomycosis in 3.6% (6 cases), and seborrheic dermatitis in 3.2% (5 cases). Table 3 shows the prevalence of other skin manifestations.

4. Discussion

Our results showed that all patients with ESRD had at least one cutaneous manifestation, consistent with the results of Rafeek M et al. and M. Sultan et al. [2,10].

Skin dryness (xerosis) was the most common cutaneous clinical finding observed in 39.87% (63) of the patients. Other studies reported skin dryness occurring in 26%, 54%, 69%, and 90% of the patients [2,6,10,11]. The etiological factors that may contribute to skin dryness in ESRD patients include atrophy of sebaceous glands and eccrine sweat glands, high-dose diuretic regimens, and hypervitaminosis A due to alterations in vitamin A metabolism [8].

Itching (pruritus)-induced excoriations were the second most common cutaneous clinical finding reported in 31% (49) of the patients. This finding correlates well with other studies, such as those conducted by Rafeek M et al. and Munir Shaikh et al., who found that itching was the second most common cutaneous complaint in ESRD patients on dialysis [6,10]. Abrol et al., Reema Mirza et al., and Irfana Munir Shaikh et al. also reported itching in 60%, 64.6%, and 67% of ESRD patients, respectively [6,11,12]. The higher results of these studies may be explained by the geographical distribution and higher frequency of diabetic patients in their studies. Itching is an early finding that can increase the risk of morbidity in these patients. It may be localized or generalized; when localized, the forearms and upper back are predominantly affected. The etiology of itching is still unknown, but some hypotheses, such as the immune hypothesis and neural hypothesis, are considered to play a role in ESRD-associated pruritus [8].

Pigmentary changes in the form of hyperpigmentation were observed in nine patients (6%), which is low compared with other studies that reported 25% and 74% [2,12,13,14]. A possible cause of pigmentary changes is the kidney's failure to excrete beta-melanocyte-stimulating hormone (β -MSH), leading to an increase in melanin deposition in the basal layer [8].

Cutaneous infections were observed in only six patients (3.6%). The reported infections included tinea pedis, groin candidiasis, and scabies in two cases (1.27%). M. Sultan et al. reported cutaneous infections in 40% of ESRD patients in Egypt [2]. The lower percentage of cutaneous infections in the present study may be due to the lower percentage of diabetes-associated ESRD in addition to the use of antibiotics.

Nail changes were observed in 7.5% of the patients. The most common change was onychomycosis in 3.6% (6 cases), followed by chronic paronychia in 1.9% (3 cases), half-and-half nails in 1.27% (2 cases), and onycholysis in 0.63% (1 case). Other studies reported half-and-half nails in 6.9%–30% of the patients [10,12,14]. The causes of nail change remain unclear, but these changes are more prevalent in diabetic patients [8].

In this study, various changes were observed in 18 patients, including prurigo in six patients (3.6%), seborrheic dermatitis in five patients (3.2%), calcinosis cutis and acquired Ichthyosis in three patients (1.9%), and neurodermatitis and hair thinning in one patient (0.63%). The features of acquired perforating dermatosis, purpura, and nephrogenic fibrosing dermopathy were not seen in the study population.

In comparing skin manifestations between our study participants and the general population with no CKD, a European study reported a higher prevalence of xerosis in 60% of the middle-aged and elderly population [15]. By contrast, German and Nigerian studies reported a lower prevalence of itching at 22.6% and 23.8%, respectively [16,17].

5. Limitations

Although almost all hemodialysis patients were fully examined for skin, hair, and nail manifestations, the prevalence of skin changes in these patients could not be determined because the study population did not represent all ESRD patients. A future case–control study is needed to assess whether these skin conditions are more prevalent in hemodialysis patients than in other individuals. In addition, our study had a diagnostic limitation, as some skin manifestations needed further investigation to be accurately diagnosed.

6. Conclusion

In this study, the most common etiology for ESRD was hypertension, followed by diabetes mellitus; familial polycystic kidney and Bechet’s disease were the least common. Moreover, xerosis was the most common cutaneous comorbidity, followed by pruritus and hyperpigmentation. Prophylactic measures, such as the application of moisturizers and sunscreen to prevent xerosis and hyperpigmentation, need to be addressed. Dermatologists must encourage patients to have good self- and oral hygiene.

7. Highlights

- The prevalence of hemodialysis centers has improved the overall mortality and life expectancy of ESRD patients.
- Patients with ESRD have various skin manifestations, ranging from simple skin dryness to severe, life-threatening calciphylaxis.
- The early recognition and treatment of hemodialysis-related cutaneous comorbidities may improve patients’ quality of life.

Ethical approval

Ethical approval was received according to the ongoing regulations of King Abdullah University Hospital.

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Author contributions

All authors read and approved the content of the submitted study.

Declaration of competing interest

The authors report no conflicts of interest.

Provenance and peer review

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Table (1): Sociodemographic characteristics of the participants

Characteristic		Count	%
Gender	Male	80	50.6%
	Female	78	49.4%

Age groups	18–27 years	13	8.23%
	28–37 years	18	11.39%
	38–47 years	36	22.78%
	48–57 years	29	18.35%
	58 years and above	62	39.24%

Table (2): Etiology of end-stage renal disease among patients on hemodialysis

Etiology	Count	%
Hypertension	77	48.7%
Polycystic kidney	1	0.6%
Diabetes mellitus	36	22.8%
Drugs	11	7.0%
Obstructive uropathy	13	8.2%
Nephrotic syndrome	8	5.1%
Lupus	6	3.8%
Behcet's disease	1	0.6%
FMF	2	1.3%
Vasculitis	3	1.9%

Table (3): Number and percentage of skin manifestations among patients on hemodialysis

Skin Manifestation	Count	%
Hyperpigmentation	9	5.7%
Scabies	2	1.27%
Calcinosis cutis	3	1.9%
Chronic paronychia	3	1.9%
Tinea pedis	2	1.27%
Hair thinning	1	0.63%
Ichthyosis vulgaris	3	1.9%
Onycholysis	1	0.63%

Excoriations due to itching	49	31.01%
Dryness	63	39.87%
Prurigo	6	3.8%
Neurodermatitis	1	0.63%
Onychomycosis	6	3.8%
Half-and-half nails	2	1.27%
Seborrheic dermatitis	5	3.16%
Groin candidiasis	2	1.27%

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