ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Evaluation of Dermatological Findings in Hemodialysis Patients

Hemodiyaliz Hastalarında Dermatolojik Bulguların Değerlendirilmesi

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ABSTRACT

Aim: *Chronic kidney disease is an increasing global public health concern. Hemodialysis is the most commonly utilized replacement therapy for end-stage renal disease. Common dermatological complications in hemodialysis patients, such as pruritus, xerosis, and nail or mucosal changes, significantly impair quality of life. This study aims to assess the prevalence and characteristics of these dermatological findings in hemodialysis patients.*

Materials and Methods: *This cross-sectional study was carried out between September 20 and November 20, 2020, in a city in Eastern Türkiye. A total of 132 hemodialysis patients underwent a detailed dermatological examination. All pathological dermatological findings were documented, and their associations with comorbidities, duration of hemodialysis, frequency of hemodialysis, and age were evaluated.*

Results: *At least one dermatological finding was detected in all cases among the 132 patients included in the study (mean age: 58.06 years; 48.5% female). Pruritus was observed in 36.4% of the patients, while xerosis was noted in 50%. Nail changes were recorded in 60.6% of the patients. Among oral mucosal findings, the most common were xerostomia (28%) and oral candidiasis (18.2%). Pigmentation disorders were identified in 39.4% of the patients, whereas 38.6% exhibited local complications at the fistula site. Advanced age was significantly associated with a higher prevalence of pruritus (p=0.003), xerosis (p=0.039), and oral candidiasis (p=0.008).*

Conclusion: *Dermatological findings are common and diverse in hemodialysis patients. Pruritus, xerosis, and oral candidiasis significantly increase with aging, highlighting the need for targeted dermatological care. These findings underscore the importance of regular dermatological evaluations to improve patient outcomes and quality of life.*

Key words: *skin; dermatologic manifestation; hemodialysis; mucocutaneous*

ÖZET

Amaç: *Kronik böbrek hastalığı, giderek artan küresel bir halk sağlığı sorunudur. Hemodiyaliz, son dönem böbrek yetmezliği için en sık kullanılan tedavi yöntemidir. Hemodiyaliz hastalarında kaşıntı, kserozis ve tırnak veya mukozal değişiklikler gibi yaygın dermatolojik komplikasyonlar, yaşam kalitesini önemli ölçüde bozabilmektedir. Bu çalışma, hemodiyaliz hastalarındaki bu dermatolojik bulguların prevalansını ve özelliklerini değerlendirmeyi amaçlamaktadır.*

Materyal ve Metod: *Bu kesitsel çalışma, 20 Eylül – 20 Kasım 2020 tarihleri arasında Türkiye'nin doğusunda bir şehirde gerçekleştirilmiştir. Toplam 132 hemodiyaliz hastası detaylı bir dermatolojik muayeneden geçirilmiştir. Tüm patolojik dermatolojik bulgular kaydedilmiş ve bunların eşlik eden hastalıklarla, hemodiyaliz süresi, hemodiyaliz sıklığı ve yaş ile ilişkileri değerlendirilmiştir.*

Bulgular: *Çalışmaya dâhil edilen 132 hastanın tamamında (ortalama yaş: 58,06; %48,5'i kadın) en az bir dermatolojik bulgu saptandı. Hastaların %36,4'ünde kaşıntı, %50'sinde ise kseroz gözlendi. Tırnak değişiklikleri %60,6'sında kaydedildi. Oral mukozal bulgular arasında en sık kserostomi (%28) ve oral kandidiyazis (%18,2) görüldü. Hastaların %39,4'ünde pigmentasyon bozuklukları saptanırken, %38,6'sında fistül bölgesinde lokal komplikasyonlar bulundu. İleri yaş, kaşıntı (p=0,003), kserozis (p=0,039) ve oral kandidiyazis (p=0,008) prevalansının anlamlı şekilde daha yüksek olmasıyla ilişkiliydi.*

Sonuç: *Dermatolojik bulgular, hemodiyaliz hastalarında yaygın ve çeşitlidir. Kaşıntı, kserozis ve oral kandidiyazis yaşla birlikte anlamlı olarak artış göstermekte olup, hedeflenmiş dermatolojik bakım ihtiyacını vurgulamaktadır. Bu bulgular, düzenli dermatolojik değerlendirmelerin hasta sonuçlarını ve yaşam kalitesini iyileştirmedeki önemini ortaya koymaktadır.*

Anahtar kelimeler: *deri; dermatolojik bulgu; hemodiyaliz; mukokutanöz*

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Introduction

Chronic kidney disease is a significant public health concern with an increasing prevalence worldwide, particularly in developed countries[1]. Chronic kidney disease is classified into five stages, with stage 5 characterized by a glomerular filtration rate below 15 ml/min/1.73 m^2 or the necessity for renal replacement therapy[2]. Renal replacement therapy is provided through one of three methods: hemodialysis, peritoneal dialysis, or renal transplantation, depending on the patient's clinical condition[3]. Among these methods, hemodialysis is the most commonly preferred treatment. However, hemodialysis therapy is still associated with numerous complications. These complications significantly reduce patients' quality of life and may lead to life-threatening conditions that are challenging to manage[4].

Pruritus, xerosis, and skin infections are among the most commonly encountered dermatological complications in patients undergoing hemodialysis therapy[5]. While some of these issues arise as a result of the natural course of chronic kidney disease, others develop directly due to dialysis treatment[6]. The skin plays a critical role not only in assessing the quality of life of patients but also as an indicator of overall health status[5]. Previous studies report considerable variation in the prevalence and clinical presentation of dermatological findings in hemodialysis patients. These differences reflect variability among populations and the limited number of studies available on the subject[5–8].

In this study, dermatological findings observed in patients undergoing hemodialysis therapy were thoroughly examined, and the data obtained were compared with the existing literature. The primary aim of the study is to identify common and rare dermatological changes in this patient group and to reveal their associations with accompanying comorbidities. The data obtained in this context are intended to provide guiding contributions to clinical practices for the dermatological evaluation of hemodialysis patients.

Materials and Methods

This study has a descriptive and cross-sectional design, encompassing all patients undergoing hemodialysis therapy in a city located in eastern Türkiye who agreed to participate. The study was conducted between September 20, 2020, and November 20, 2020. The patients included in the study were thoroughly evaluated by a dermatologist during their visits to dialysis centers. A comprehensive dermatological examination was performed on all patients, with suspicious lesions evaluated dermoscopically, microscopic analyses conducted, and histopathological examinations performed when necessary. All pathological findings identified during the study were meticulously documented. Ethical approval for the study was obtained from the ethics committee, and written informed consent forms were collected from all participants.

Statistical analyses were performed using Statistical Package for Social Sciences (SPSS) program version 20.0 software (IBM Corp., Armonk, NY, USA). Descriptive statistics of the data were presented as frequencies and percentages, while the chi-square test was used for pairwise comparisons. A p-value of <0.05 was considered statistically significant.

Results

A total of 132 patients aged 17–90 years (mean: 58.06) were included in the study. Of these, 48.5% (n=64) were female, and 51.5% (n=68) were male. Chronic kidney failure was attributed to hypertension in 35.6% (n=47) and diabetes mellitus (DM) in 28.8% (n=38) of the patients. The mean duration of hemodialysis was calculated as 65.5 months. The sociodemographic characteristics and comorbidities of the patients are presented in Table 1.

All patients included in the study exhibited at least one mucocutaneous finding. Pruritus was reported by 36.4% (n=48) of the patients, with its severity assessed using a visual analog scale (VAS) ranging from 1 to 100. Of these, 13.6% (n=18) rated their pruritus severity as 50 or higher. Nail changes were observed in 60.6% (n=80) of the patients, including conditions such as onychomycosis, half-and-half nails, absent lunula, Terry's nails, leukonychia, Muehrcke's lines, splinter hemorrhages, onycholysis, vertical ridging, yellow nails, and onychogryphosis.

Additionally, oral candidiasis was detected in 18.2% (n=24) of the patients, xerostomia in 28% (n=37), and at least one oral mucosal abnormality other than candidiasis and xerostomia in 17.4% (n=23). The most common mucosal abnormality was a black hairy tongue, observed in 8.3% (n=11) of the patients. Based on biopsy results, two patients were diagnosed with systemic lupus erythematosus (SLE), and three with perforating dermatosis. Local complications such

Table 1. *Sociodemographic characteristics and comorbidities of hemodialysis patients*

Variable	n	(%)
Gender		
Female	64	48.5
Male	68	51.5
Age (years)		
15–40	20	15.2
41–65	66	50
≥66	56	34.8
Duration of hemodialysis		
<3 years	56	42.4
>3 years	76	57.6
Hemodialysis frequency (per week)		
1 Session	5	3.8
2 Session	127	96.2
Comorbidities		
Hypertension	97	73.5
Diabetes mellitus	50	37.9
Cerebrovascular disease	3	2.3
Obesity	11	8.3
Coronary artery disease	29	22.0

Table 2. *Mucocutaneous changes identified in hemodialysis patients*

		n	(%)
Mucocutaneous condition		48	36.4
Pruritus		66	50
Xerosis		42	31.8
Pallor			
	Oral candidiasis	24	18.2
	Herpes zoster	2	1.5
	Pityriasis versicolor	15	11.4
	Tinea cruris	10	7.6
	Folliculitis	29	22.0
Pigmentation disorders			
	Uremic pigmentation	52	39.4
	Melasma	16	12.1
	Vitiligo	3	2.3
	Hypopigmentation	3	2.3
Oral mucosal disorders			
	Black hairy tongue	11	8.3
	Scrotal tongue	3	2.3
	Geographic tongue	6	4.5
	Macroglossia	1	0.8
	Atrophic glossitis	5	3.8
	Xerostomia	37	28.0
	Uremic fetor	7	5.3
	Angular cheilitis	6	4.5
Nail disorders		80	60.6
Purpura/ecchymosis		43	32.6
Keloid formation		3	2.3
Nephrogenic fibrosing dermopathy		1	0.8
Perforating dermatosis		3	2.3
Systemic lupus erythematosus		2	1.5
Local complications		51	38.6

as infections or eczematization at the fistula site were identified in 38.6% (n=51) of the patients. Data on mucocutaneous changes are detailed in Table 2.

The relationship between dermatological findings and patients' age, duration of hemodialysis, and weekly frequency of hemodialysis was evaluated. While no significant association was found between the duration or frequency of hemodialysis and dermatological changes, older age was significantly associated with higher frequencies of pruritus (p=0.003), xerosis (p=0.039), and oral candidiasis (p=0.008).

Discussion

Dermatological changes commonly observed in hemodialysis patients lead to significant issues that adversely affect their quality of life. This study contributes to the literature by providing a detailed analysis of the prevalence and clinical significance of mucocutaneous changes in a large patient cohort. Our findings are generally consistent with the literature while highlighting some unique features.

In 100% of the hemodialysis patients, at least one dermatological issue was identified. In the literature, xerosis has been reported as the most common finding, with prevalence rates reaching up to 96%[5,8–11]. However, Adégbidi et al.[12] (2020) reported this rate as 48%. Similarly, xerosis was observed in 50% of our patients. Disruption of the epidermal barrier and loss of function in sweat glands have been cited as the primary causes of xerosis[13]. Additionally, abnormalities in vitamin A metabolism and malnutrition are also significant contributing factors[8].

Pruritus was identified in 36.4% of our patients. Prevalence rates in the literature range between 21% and 74%[7,8]. Although the exact pathogenesis of pruritus remains unclear, it has been associated with

hyperparathyroidism, xerosis, hypervitaminosis A, anemia, and elevated serum levels of magnesium, calcium, phosphate, and aluminum. Allergic sensitivity to dialysis membranes has also been proposed as a possible cause[14]. Dyachenko et al.[7] reported that pruritus was not correlated with xerosis or excoriations but rather resulted from the accumulation of uremic toxins, which can be improved with effective hemodialysis. Additionally, they observed an increased incidence of neuropathy in these patients[15]. In the study by Dwiyana et al., findings consistent with ours indicated that xerosis and pruritus increased with age in dialysis patients[16].

Pallor in patients is expected due to chronic disease and erythropoietin deficiency, while yellowing of the skin is attributed to the accumulation of fat-soluble pigments such as carotenoids and urobilinogen in the dermis and subcutaneous tissue[14]. In our study, pallor was observed in 31.8% of the patients. Uremic pigmentation is frequently reported in the literature and is characterized by hyperpigmentation in sun-exposed areas, considered a hallmark symptom. This condition has been associated with increased levels of melanocyte-stimulating hormones in tissues[6]. Additionally, increased skin pigmentation has been noted following dialysis initiation, often manifesting as grayish-brown discoloration due to hemosiderin deposition. In the study by Anees et al.,[17] hyperpigmentation was identified as the most common finding, observed in 86% of patients. Similarly, Tajalli et al.[5] reported pigmentation in 89.8% of their study population. However, in our study, the prevalence of pigmentation was lower, at 39.4%.

In patients with end-stage renal disease (ESRD), the immune system is suppressed due to impairments in host defenses. This suppression is characterized by reduced neutrophil function, leukopenia associated with complement activation, diminished phagocytic capacity, weakened T and B lymphocyte functions, and decreased natural killer cell activity[18]. In our study, an increased incidence of mycotic and bacterial infections was observed among the patients. Local complications such as eczematization and infection at the fistula site were reported in 38.6% of the patients. According to the literature, 48–73% of bacteremias are attributed to vascular access sites, and infections are the second most common cause of death in ESRD patients, following coronary artery disease[19]. Therefore, maintaining personal hygiene is essential, and healthcare professionals should exercise maximum caution with antisepsis at vascular access sites during dialysis.

In our study, oral candidiasis was classified as an infectious disease and detected in 18.2% of the patients. The prevalence of oral candidiasis in the literature has been reported to range from 8% to 12%[20,21]. Xerostomia was the most frequently observed oral mucosal complaint in our study, with a prevalence of 28%. However, another study evaluating the oral findings of hemodialysis patients reported a significantly higher prevalence of 70%[21]. The lower prevalence of xerostomia in our patient group may be attributed to the subjective nature of the evaluations. Xerostomia in hemodialysis patients is thought to result from factors such as uremic involvement of the salivary glands, chemical inflammation, mouth breathing, restricted fluid intake, and dehydration[21]. Apart from oral candidiasis and xerostomia, at least one oral mucosal finding was identified in 17.4% of the patients. Ensuring proper oral hygiene in hemodialysis patients is crucial for preventing these pathologies.

Nail changes were observed in 60.6% of the patients in our study, with onychomycosis being among the most frequently identified nail conditions. In Altun's study,[6] onychomycosis was detected in 40.6% of patients, whereas Eftekhari et al.[22] reported a lower prevalence of 12.8%. In the latter study, similar to ours, 37.5% of the patients had diabetes, and among them, 17.9% were diagnosed with onychomycosis. Factors such as age, gender, education level, and dialysis access type are thought to increase the risk of onychomycosis[22]. In our study, a significant association was also observed between older age and a higher frequency of onychomycosis. Since onychomycosis poses a risk for complications such as erysipelas, cellulitis, or more severe infections that can lead to amputations, proper nail care and health are of critical importance in dialysis patients[22].

Ecchymotic lesions were observed in 32.6% of the patients in our study. In the study by Mourad et al.,[23] this rate was reported as 47.3%, while Tajalli et al.[5] reported a lower prevalence of 26.5%. The predisposition to ecchymosis in these patients may be associated with the use of heparin, platelet dysfunction, and increased vascular fragility[23].

Rare findings such as perforating dermatosis (2.3%) and nephrogenic fibrosing dermopathy (0.8%) were identified in our study. Although these conditions are

rarely reported in the literature, their clinical significance is considerable. Nephrogenic fibrosing dermopathy develops as a result of gadolinium, which is used as an alternative to iodinated contrast agents in patients with renal dysfunction. Patients undergoing peritoneal dialysis are at a higher risk for this condition[24]. Perforating dermatoses, on the other hand, are more commonly observed in hemodialysis patients and are associated with oxidative stress, chronic inflammation, and renal dysfunction. Uremic pruritus is thought to contribute to the tearing of collagen fibers and the body's attempt to expel these fibers, a process believed to play a significant role in the pathophysiology of perforating dermatosis[25].

Hypertension was identified as the most common comorbidity in our study, affecting 73.5% of the patients. In a cross-sectional study involving 313 patients, hypertension was reported in 74% of hemodialysis patients, with 97% of these individuals having hypertension before initiating dialysis. Factors associated with hypertension include increased weight gain between dialysis sessions, failure to achieve the target dry weight after dialysis, advanced age, and the presence of diabetes[26]. Diabetes was the second most common comorbidity in our study. Previous studies have noted that dermatological findings such as xerosis, pruritus, nail changes, and onychomycosis are more frequently observed in diabetic patients[6].

Our study has limitations. The inclusion of patients from only a single region and the short data collection period limited the evaluation of rare dermatological findings. Additionally, the heterogeneous nature of the patient population restricts the generalizability of the findings. To address these limitations, future studies with larger sample sizes and longer follow-up periods are needed.

Conclusion

In conclusion, common mucocutaneous changes in hemodialysis patients significantly impact their quality of life. Pruritus, xerosis, and oral candidiasis are shown to increase significantly with aging. Maintaining personal hygiene, ensuring regular dermatological follow-ups, and implementing early interventions are crucial for preventing these complications, improving quality of life, and reducing morbidity and mortality. To gain a more comprehensive understanding of these findings, large-scale and long-term advanced studies are recommended.

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