

## ORIGINAL RESEARCH OPEN ACCESS

# Feet in Peril: Assessment of Feet in Patients Undergoing Haemodialysis

Aysun Ünal<sup>1</sup> | Seher Dilan Eşsiz<sup>1</sup> | Üstün Yılmaz<sup>1</sup> | Bilge Bal Özkaptan<sup>2</sup>  | Nurten Ozen<sup>3</sup> 

<sup>1</sup>Haemodialysis Unit, Antalya Training and Research Hospital, Antalya, Türkiye | <sup>2</sup>Department of Nursing, Faculty of Health Sciences, Sinop University, Sinop, Türkiye | <sup>3</sup>Department of Internal Medicine Nursing, Faculty of Nursing, İstanbul University, İstanbul, Türkiye

**Correspondence:** Bilge Bal Özkaptan ([bozkaptan@sinop.edu.tr](mailto:bozkaptan@sinop.edu.tr))

**Received:** 11 June 2025 | **Revised:** 13 March 2026 | **Accepted:** 23 March 2026

**Keywords:** education | foot | haemodialysis | health professional

## ABSTRACT

**Background:** Foot problems are common in haemodialysis patients, making treatment and disease management difficult due to their serious complications and creating a significant financial burden on healthcare expenses.

**Objective:** In this study, we assessed the foot problems in haemodialysis patients.

**Design:** A retrospective descriptive and single-centre study was conducted.

**Participants:** The study was conducted with 75 patients undergoing haemodialysis treatment between 1 January and 31 August 2024. The study was granted ethical approval before data were collected.

**Measurements:** An assessment form that included the introductory characteristics of the patients was used to collect data, and the results of the foot assessment performed by the podiatrist.

**Results:** We detected at least one foot problem in 70.6% of the participants. The three most common foot problems were dryness/cracks (45.3%), onychomycosis (28.3%), and calluses (15.2%). Foot problems were significantly more common in individuals who were 51 years old or older ( $p = .019$ ), as well as in those with diabetes ( $p < .001$ ) and hypertension ( $p = 0.001$ ).

**Conclusion:** Different types of foot problems, particularly dryness and cracks, were identified in haemodialysis patients. These findings highlight the importance of routine foot assessments in dialysis units and the need to integrate structured foot care education into clinical practice to prevent potential complications from arising.

## 1 | Introduction

Foot problems are serious issues in patients receiving haemodialysis treatment (Özdemir and Nural 2024). Foot ulcers are the most common foot problems in patients receiving haemodialysis treatment. They include skin dryness and itching, gangrene due to impaired tissue perfusion, nail problems, foot fungus, and other foot infections. They deteriorate the quality of life related to health and significantly increase the financial burden on patients. Foot ulcers are the most common condition among foot problems (Orimoto et al. 2013; Valabhji 2012); they are associated with significant morbidity and mortality around the world. The main reasons for foot ulcers in haemodialysis patients include uraemia, anaemia,

uraemic neuropathy, lower extremity oedema, hypoalbuminemia, greater susceptibility to infection, and a decrease in skin perfusion in the feet during haemodialysis (Brekelmans et al. 2019; Kaminski et al. 2015; Locking-Cusolito et al. 2005). Foot ulcers can cause deep infections such as cellulitis, osteomyelitis, periostitis, other infections of the bone, and gangrene in patients, leading to hospitalisation, loss of extremities, and death (Otte et al. 2015).

## 2 | Literature Review

As reported in various studies, patients with end-stage renal disease and concurrent diabetes mellitus undergoing dialysis

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial](https://creativecommons.org/licenses/by-nc/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

© 2026 The Author(s). *Journal of Renal Care* published by John Wiley & Sons Ltd on behalf of European Dialysis & Transplant Nurses Association/European Renal Care Association.

treatment have the greatest risk for developing lower limb complications. Despite that, patients with renal disease but without diabetes have high rates of risk factors similar to those of patients with renal disease and diabetes (Ndip et al. 2010; Valabhji 2012). Foot problems of haemodialysis patients make treatment and disease management difficult due to their serious complications and impose a heavy financial burden related to healthcare. Foot problems and the risk of major lower extremity amputation due to these problems are high in haemodialysis patients (Özdemir and Nural 2024; Yumang et al. 2009). To provide better foot care in chronic haemodialysis patients, patient education on foot care, along with foot checks and care performed by dialysis nurses, is also a highly effective approach (Özdemir and Nural 2024; Ataseven and Namoglu 2020). Regular follow-ups by a podiatrist for haemodialysis patients are important for maintaining foot health and preventing complications. Therefore, clinicians must implement a foot care programme that includes regular evaluations and patient education on foot care practices and shoe selection for haemodialysis patients (Locking-Cusolito et al. 2005; Reda et al. 2012).

There are limited studies on common foot problems of dialysis patients. This study aims to create awareness of foot problems in patients receiving haemodialysis treatment and to contribute to the literature on the type and prevalence of foot problems. The data obtained from this study can guide studies on the prevention and management of foot problems in haemodialysis patients.

Although several studies have addressed foot complications in dialysis populations, most have focused on patients with concomitant diabetes mellitus or have investigated isolated complications such as ulceration or amputation. Research on the systematic evaluation of the full spectrum of foot problems, including dermatological, infectious, vascular, and structural conditions, among patients receiving maintenance haemodialysis regardless of diabetes status, is scarce. Additionally, most published studies lack standardised podiatric assessments performed in the clinical setting where dialysis care is administered routinely. By conducting structured foot assessments during haemodialysis sessions in Türkiye, we aimed to provide a comprehensive overview of the prevalence and types of foot problems in this underrepresented patient population. Our study may contribute to the limited body of evidence available and highlight the value of integrating regular podiatric examination into routine dialysis care.

In this study, we examined foot problems in patients undergoing haemodialysis and generated data that may inform preventive strategies and targeted interventions for this vulnerable group.

### 3 | Materials and Methods

#### 3.1 | Study Design

We conducted a retrospective, descriptive, and single-centre study in the haemodialysis unit of a training and research hospital between 1 January and 31 August, 2024, to investigate foot problems in patients receiving haemodialysis treatment.

#### 3.2 | Participants

The target population consisted of 78 patients who were administered treatment in the haemodialysis unit. We did not select a sample and aimed to reach the entire target population. Three patients were excluded from the study because they had a foot amputation, and the study was conducted with 75 patients.

#### 3.3 | Data Collection

The data were collected using an assessment form that included the descriptive characteristics of the patients and the results of the foot assessments performed by the podiatrist. In the haemodialysis unit where the study was conducted, a podiatrist was appointed, and regular foot assessments of haemodialysis patients were conducted by the podiatrist. These data were obtained from the initial foot assessment performed by a podiatrist. Foot problems were re-evaluated after care was provided by the podiatrist and the nurse. The findings were recorded in the foot assessment form and added to the medical files of the patients. The form also included the treatments and nursing care practices applied or recommended for the identified foot problems.

The 'Foot Assessment Form' used by the podiatrist in the haemodialysis unit where the study was conducted included information on the socio-demographic characteristics of the patients, the presence and type of foot-related complaints, physical examination findings related to the feet, the location and severity of any pain, the treatments and care practices administered for foot problems, and the preventive measures and practices performed to avoid foot complications. Foot Assessment Form is one of the hospital's standard patient assessment forms used to evaluate foot problems in patients in the haemodialysis unit.

#### 3.4 | Data Analysis

The data were managed using IBM SPSS Statistics for Windows, Version 25.0 (SPSS; IBM Corp., Armonk, NY, USA) software. The normality of the data distribution was evaluated using skewness and kurtosis values, as well as by conducting the Shapiro-Wilk test. Descriptive statistics of continuous numerical variables were presented using the mean  $\pm$  standard deviation, and categorical variables were presented using number (n) and percentage (%). In this study, univariate analyses, including descriptive statistics and the Chi-square test, were used to evaluate the relationships between variables. All results were considered to be statistically significant at  $p \leq 0.05$  when making statistical decisions. The study's analyses are based on a single podiatric assessment, and there was no longitudinal follow-up of foot disorders.

#### 3.5 | Ethical Considerations

This study was conducted according to the principles of the Declaration of Helsinki. The study was approved by the local ethics committee (Meeting Date: 27.09.2024, Decision No: 2024/272). All

necessary institutional permissions and written informed consent of participants were obtained.

## 4 | Results

The study was conducted with 75 patients; the average age of the patients was  $54.92 \pm 8.25$  years, and all patients had an additional chronic disease. We found that 70.6% of the participants had at least one foot problem, 45.3% had dryness/cracks in the feet, 28.3% had onychomycosis, 15.2% had callus, and 9.4% had diabetic foot ulcers (Table 1).

Foot problems were significantly more common in individuals who were 51 years old or older ( $p = 0.019$ ), as well as in those with diabetes ( $p < 0.001$ ) and hypertension ( $p = 0.001$ ) (Figure 1). These findings emphasise that routine foot assessments and preventive care are important, particularly in older haemodialysis patients and those with comorbid conditions.

## 5 | Discussion

We found a high prevalence of foot problems among haemodialysis patients, with dryness/cracking, onychomycosis, and callus formation being the most common findings. Older individuals and those with diabetes and hypertension had significantly more frequent foot problems. Our findings indicate

that age and comorbid chronic diseases are important risk factors for foot complications in this population.

In this study, foot problems were detected in 70.6% of patients with chronic renal failure receiving haemodialysis treatment. The most common problems were dryness and cracks in the feet (45.3%), onychomycosis (28.3%), callus (15.2%), diabetic foot ulcer (9.4%), and peripheral neuropathy (1.8%). These findings indicate that foot problems are highly prevalent among haemodialysis patients and align with published studies, which reported that haemodialysis patients are at a greater risk for foot ulcers and subsequent lower extremity amputation (Otte et al. 2015; Kaminski et al. 2015). Many studies have reported that dermatological and podiatric complications are common in patients undergoing haemodialysis, with at least one dermatological problem developing in most cases (Mirza et al. 2012; Mourad et al. 2014; Shah et al. 2013). Altun (2022) conducted a study and reported that 42.5% of patients had nail changes, which is comparable to our finding of 28.3% onychomycosis. Similarly, Pérez Pico et al. (2021) reported high rates of dermatopathies (97.6%) and onychopathies (98.5%), as well as toe deformities (97.1%) among dialysis patients. Similar findings across these studies reinforce the idea that dermatological complications represent a widespread and under-recognised issue in patients undergoing dialysis.

The pathogenesis related to these problems is multifactorial (Pérez Pico et al. 2021). Uraemia, metabolic imbalances, fluid and electrolyte disturbances, repeated exposure to dialysis procedures, and side effects of medications (especially immunosuppressants) contribute to skin and nail disorders. Mourad et al. (2014) stated that the distinction between cutaneous changes caused by chronic kidney disease and those resulting from haemodialysis is challenging because many conditions overlap. Skin changes in dialysis patients are generally classified into two categories: specific (e.g., acquired perforating dermatosis, calcific uraemic arteriopathy, bullous diseases, and nephrogenic fibrosing dermopathy) and non-specific (e.g., pruritus, xerosis, nail and hair disorders, pigmented changes, purpura, oral manifestations, pallor, and uraemic frost). Among these, xerosis (dry skin) is the most prevalent problem in haemodialysis patients worldwide (Mourad et al. 2014; Neelima et al. 2024; Demirci Saadet and Demir 2023; Tajalli et al. 2021), and our findings are consistent with this statement. Mourad et al. (2014) identified dry skin in 86% of haemodialysis patients, particularly affecting the lower limbs and feet, supporting our results and indicating that dryness and cracking are the leading problems. From a clinical perspective, these findings highlight the essential role of nurses and the multidisciplinary team, including podiatrists, nephrologists, and dietitians, in the early detection, management, and prevention of foot complications. Regular foot assessments, patient education on foot hygiene, moisturising practices, and timely referral to podiatry services can slow the progression of minor skin changes into ulcers or infections. The integration of structured foot assessment protocols into routine dialysis care can significantly improve patient outcomes and their quality of life. Future studies should further investigate the effectiveness of nurse-led interventions and interdisciplinary collaboration in preventing foot complications among haemodialysis patients.

When the distribution of foot problems was analysed according to the socio-demographic characteristics of the participants, we found that the frequency of onychomycosis and dryness/cracks

**TABLE 1** | Descriptive characteristics of the participants ( $n = 75$ ).

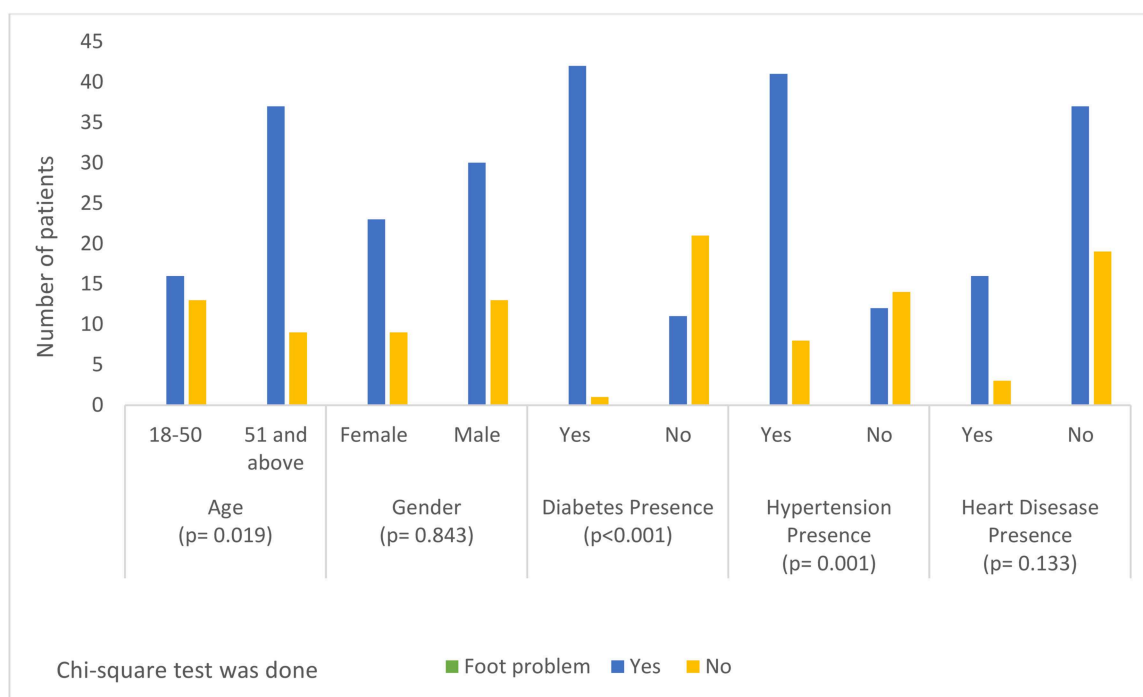
| Variable                                 |                             | <i>n</i>         | %    |
|------------------------------------------|-----------------------------|------------------|------|
| Sociodemographic characteristics         |                             |                  |      |
| 57.3                                     | Age (years) (mean $\pm$ SD) | 54.92 $\pm$ 8.25 |      |
| Gender                                   | Female                      |                  |      |
|                                          | Male                        | 32               | 42.7 |
|                                          |                             | 43               | 57.3 |
| Foot problems                            |                             |                  |      |
| Presence of foot problem                 | Yes                         | 53               | 70.7 |
|                                          | No                          | 22               | 29.3 |
| Type of foot problem <sup>a</sup>        | Dryness/Cracking            | 24               | 45.3 |
|                                          | Onychomycosis               | 15               | 28.3 |
|                                          | Callus                      | 8                | 15.2 |
|                                          | Diabetic foot ulcer         | 5                | 9.4  |
|                                          | Peripheral Neuropathy       | 1                | 1.8  |
| Additional chronic diseases <sup>b</sup> |                             |                  |      |
|                                          | Diabetes                    | 43               | 57.3 |
|                                          | Hypertension                | 49               | 65.3 |
|                                          | Heart Disease               | 19               | 25.3 |
|                                          | Cerebrovascular Accident    | 2                | 2.7  |
|                                          | Other <sup>c</sup>          | 13               | 17.3 |

Abbreviation: SD: standard deviation.

<sup>a</sup>Percentages related to foot problems were calculated based on a subgroup of patients with foot problems ( $n = 53$ ).

<sup>b</sup>Patients could have more than one additional chronic disease, so percentages for "Additional Chronic Diseases" may sum to more than 100%.

<sup>c</sup>Thyroid disease, prostate hypertrophy, osteoporosis, depression, rheumatic disease.



**FIGURE 1** | Comparison of foot problems according to the characteristics of patients.

in the feet increased significantly as age increased; we also found that dryness and cracking were more common among those with comorbidities. These findings suggest that age and chronic disease burden are important determinants of foot health in haemodialysis patients. Demirci Saadet and Demir (2023) reported that in Turkey, nail problems were more frequent among younger haemodialysis patients, indicating that population or methodological differences may be present between studies. Such discrepancies may be attributed to sample characteristics, environmental factors, or differences in hygiene and self-care practices among dialysis populations. We found that onychomycosis becomes more prevalent with age, and our results were consistent with data from other international studies. Gupta et al. (2022) emphasised that slower nail growth, cumulative microtraumas, impaired circulation, and reduced self-care ability in older adults contribute to greater fungal nail infections. Additionally, chronic diseases, particularly diabetes mellitus, further predispose individuals to onychomycosis and other dermatopathies due to microvascular damage and immunological dysfunction. Similarly, xerosis (dryness) of the skin is a frequent and multifactorial condition in this population. It may result from age-related changes in vitamin A metabolism, a decrease in glycerol content in the skin, eccrine gland dysfunction, and the use of diuretics at high doses. Mourad et al. (2014) and Neelima et al. (2024) highlighted the significant role of uraemic toxins, alterations in lipid composition of the stratum corneum, and reduction of hydration in the pathophysiology of xerosis among haemodialysis patients. Diabetes and other chronic diseases exacerbate these mechanisms, leading to more prominent skin dryness and cracks, which in turn increase susceptibility to infection and ulceration. From a clinical perspective, these findings highlight the importance of comprehensive, multidisciplinary foot care in older haemodialysis patients with comorbidities. Regular foot assessments conducted jointly by nurses and podiatrists,

targeted education on foot hygiene, early treatment of fungal infections, and the use of emollient or barrier-protective products should be integral components of routine haemodialysis care. Moreover, nurse-led screening and preventive care programmes may play a key role in reducing foot-related morbidity and improving the quality of life of patients.

We found that foot problems are highly prevalent among haemodialysis patients, with dryness/cracking, onychomycosis, and callus formation being the most common manifestations. These results align with those of international studies reporting similar dermatological complications among dialysis patients (Mourad et al. 2014; Pérez Pico et al. 2021; Otte et al. 2015). The consistency of these findings across different healthcare settings emphasises that foot problems in haemodialysis patients represent a global concern rather than a region-specific issue. From a clinical perspective, these outcomes highlight the key role of early detection, continuous monitoring, and multidisciplinary preventive care, including the contribution of nurses and podiatrists, in minimising the risk of foot ulcers and subsequent amputations. Integrating structured foot assessment protocols into routine haemodialysis care can therefore make the haemodialysis process safer for the patients and improve their quality of life.

## 5.1 | Strengths and Limitations

The greatest strengths of the study are that the foot assessment was conducted by a podiatrist and the identified problems were evaluated by an expert in the field. This study had several limitations. First, the relatively small sample size and cross-sectional design limited the ability to determine causal relationships and temporal changes in foot problems among haemodialysis patients. Second, the study was conducted in a single haemodialysis unit, which further restricted the generalizability of the findings to other clinical settings or populations. Moreover,

the use of a convenience sampling approach introduced the potential for selection bias. For example, patients with foot amputations who are likely to have more severe podiatric complications were excluded from the study. Such practices may underestimate the true prevalence of foot problems in the haemodialysis population. Third, the absence of biochemical parameters such as urea, phosphorus, Kt/V, and urea reduction rate, which can influence skin dryness and wound formation, limits the ability to determine possible physiological mechanisms underlying the observed findings. Another important limitation is the exclusive use of univariate tests without multivariate adjustment for factors such as age, diabetes, and hypertension. Finally, the absence of a validated podiatric assessment tool as an additional limitation.

## 6 | Implications for Practice

This study highlights the clinical significance of foot problems among patients receiving haemodialysis treatment and emphasises the need for regular assessment by qualified specialists. To translate these findings into practice, several concrete recommendations can be made. First, the standard care protocol should incorporate routine foot assessments for all haemodialysis patients, ideally conducted by a podiatrist or a nurse trained in podiatric assessment. The establishment of a structured foot screening programme in dialysis units may facilitate early detection of problems such as dryness, cracks, or fungal infections, thereby preventing progression to ulcers or amputations. Second, haemodialysis nurses should integrate foot assessment and care planning into their routine nursing documentation and patient education processes. Educating patients on daily foot hygiene, proper footwear, moisturising practices, and early symptom reporting can help these patients actively maintain their foot health. Third, multidisciplinary collaboration should be reinforced. Institutional policies and national clinical guidelines should support the inclusion of podiatrists in dialysis teams, along with nephrologists, dietitians, and nurses, to ensure continuity and quality of care. Finally, incorporating foot care content into ongoing in-service training and educational programmes for haemodialysis nurses can enhance clinical competency and improve patient outcomes.

## 7 | Conclusion

To summarise, this study demonstrated the high prevalence of foot problems among patients undergoing haemodialysis and highlighted the effect of age and comorbid conditions particularly diabetes and hypertension on the development of these complications. These findings reinforce that systematic and regular foot assessments are needed as an integral component of routine haemodialysis care. Based on these results, we recommend the incorporation of structured foot screening and preventive care protocols within dialysis units. Given their continuous contact with patients, nurses are in a key position to perform early detection, provide education on foot hygiene, and implement evidence-based preventive strategies. The inclusion of podiatrists in multidisciplinary teams, comprising nephrologists, nurses, and dietitians, should be supported by institutional policies and clinical guidelines to enhance care coordination and decrease complication rates. International studies have shown that integrating

podiatry services into renal care is a feasible and cost-effective strategy across different healthcare systems and can help improve patient outcomes. To ensure that the process is sustainable, care protocols should include scheduled monthly podiatry evaluations and follow-up documentation. Finally, multicentre and longitudinal studies are needed to validate these findings and identify the most effective interdisciplinary models for preventing and managing foot complications in the haemodialysis population.

## Author Contributions

A.U. conceived the study, participated in design and coordination, read and approved the final manuscript; S.D.E. participated in design, coordination, and data collection, read, and approved the final manuscript. U.Y. participated in design, coordination and approved the final manuscript. B.B.O. participated in design and coordination, helped to draft the manuscript, and read and approved the final manuscript. N.O. participated in design and coordination, helped to draft the manuscript, and read and approved the final manuscript.

## Acknowledgements

Thank you to the participants who took part in this study.

## Funding

The authors have nothing to report.

## Ethics Statement

The study was approved by the Sinop University Human Research Ethics Committee (Meeting Date: 27.09.2024, Decision No: 2024/272).

## Conflicts of Interest

The authors declare no conflicts of interest.

## Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

## References

- Altun, E. 2022. "Hemodiyaliz Tedavisine Devam Eden Hastalarda Cilt Lezyonlarının Sıklığı ve İlişkili Faktörler: Tek Merkez Deneyimi." *Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi Dergisi* 17, no. 2: 134–139.
- Ataseven, M., and S. S. Namoglu. 2020. "Assessment of Knowledge Level and Training Needs about Diabetic Foot Care Practices of Diabetic Patients Undergoing Hemodialysis." *International Journal of Caring Sciences* 13, no. 3: 1878–1889.
- Brekelmans, W., B. L. S. Borger van der Burg, M. A. Vroom, M. J. Kreuger, A. M. Schrande van der Meer, and R. Hoencamp. 2019. "Prevalence of Foot Ulcers in Dialysis-Dependent Patients." *Wound Repair and Regeneration* 27, no. 6: 687–692.
- Demirci Saadet, E., and M. E. Demir. 2023. "Investigation of Dermatological Manifestations in Maintenance Hemodialysis Patients." *Journal of Health Sciences and Medicine* 6, no. 6: 1331–1336.
- Gupta, A. K., M. Venkataraman, and M. Talukder. 2022. "Onychomycosis in Older Adults: Prevalence, Diagnosis, and Management." *Drugs & Aging* 39, no. 3: 191–198.
- Kaminski, M. R., A. Raspovic, L. P. McMahon, et al. 2015. "Risk Factors for Foot Ulceration and Lower Extremity Amputation in Adults With



End-Stage Renal Disease on Dialysis: A Systematic Review and Meta-Analysis." *Nephrology Dialysis Transplantation* 30, no. 10: 1747–1766.

Locking-Cusolito, H., L. Harwood, B. Wilson, et al. 2005. "Prevalence of Risk Factors Predisposing to Foot Problems in Patients on Hemodialysis." *Nephrology nursing journal: journal of the American Nephrology Nurses' Association* 32, no. 4: 373–384.

Mirza, R., R. Wahid, and H. Talat. 2012. "Dermatological Manifestations in Chronic Renal Failure Patients on Haemodialysis." *Journal of Liaquat University of Medical and Health Sciences* 11, no. 1: 24–28.

Mourad, B., D. Hegab, K. Okasha, and S. Rizk. 2014. "Prospective Study on Prevalence of Dermatological Changes in Patients Under Hemodialysis in Hemodialysis Units in Tanta University Hospitals, Egypt." *Clinical, Cosmetic and Investigational Dermatology* 11, no. 7: 313–319.

Ndip, A., L. A. Lavery, J. Lafontaine, et al. 2010. "High Levels of Foot Ulceration and Amputation Risk in a Multiracial Cohort of Diabetic Patients on Dialysis Therapy." *Diabetes Care* 33, no. 4: 878–880. <https://doi.org/10.2337/dc09-2007>.

Neelima, C., G. Purnima, P. Srilakshmi, V. K. Kumar, L. Sreedevi, and V. Kumari. 2024. "Study on Cutaneous Manifestation in Chronic Renal Failure Patients on Hemodialysis." *European Journal of Cardiovascular Medicine* 14: 870–878.

Orimoto, Y., T. Ohta, H. Ishibashi, et al. 2013. "The Prognosis of Patients on Hemodialysis With Foot Lesions." *Journal of Vascular Surgery* 58, no. 5: 1291–1299.

Otte, J., J. J. van Netten, and A. J. J. Woittiez. 2015. "The Association of Chronic Kidney Disease and Dialysis Treatment With Foot Ulceration and Major Amputation." *Journal of Vascular Surgery* 62, no. 2: 406–411.

Özdemir, V. A., and N. Nural. 2024. "Risk Factors and Frequency of Foot Ulceration in Patients Receiving Chronic Hemodialysis Treatment." *Advances in Skin & Wound Care* 37, no. 4: 203–210.

Pérez Pico, A. M., P. Dorado, M. Á. Santiesteban, E. Mingorance-Alvarez, V. García-Bernalt Funes, and R. Mayordomo. 2021. "Prevalence of Foot Disorders According to Chronic Kidney Disease Stage." *Journal of renal care* 47, no. 1: 17–26.

Reda, A., S. Hurton, J. M. Embil, et al. 2012. "Effect of a Preventive Foot Care Program on Lower Extremity Complications in Diabetic Patients With End-Stage Renal Disease." *Foot and Ankle Surgery* 18, no. 4: 283–286.

Shah, A., R. Hada, and B. M. M. Kayastha. 2013. "Dermatological Disorders in Chronic Kidney Disease." *Journal of Nepal Medical Association* 52, no. 190: 365–371.

Tajalli, F., S. M. S. Mirahmadi, S. Mozafarpour, A. Goodarzi, M. Nasiri Partovi, and D. Lakestani. 2021. "Mucocutaneous Manifestations of Patients With Chronic Kidney Disease under Hemodialysis: A Cross-Sectional Study of 49 Patients." *Dermatologic Therapy* 34, no. 4: e15015.

Valabhji, J. 2012. "Foot Problems in Patients With Diabetes and Chronic Kidney Disease." supplement, *Journal of renal care* 38, no. Suppl 1: 99–108. <https://doi.org/10.1111/j.1755-6686.2012.00284.x>.

Yumang, M. J., L. Hammond, N. Filteau, and M. Purden. 2009. "Perceptions of Risk for Foot Problems and Foot Care Practices of Patients on Hemodialysis." *Nephrology nursing journal: journal of the American Nephrology Nurses' Association* 36, no. 5: 509–516.