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# Clinical Characterization and Longitudinal Outcomes of Chronic Kidney Disease-Associated Pruritus: A Prospective Analysis of 45 Hemodialysis Cases

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**Abstract** **Original Research Article**

Chronic kidney disease-associated pruritus (CKD-aP) is a frequent and often underestimated complication in patients undergoing maintenance hemodialysis. Despite improvements in renal replacement therapy, pruritus remains a major source of physical discomfort and psychological distress, significantly affecting sleep quality, emotional well-being, and overall quality of life. In clinical practice, early recognition and adequate management of CKD-aP are essential to improve patient outcomes and reduce symptom burden. This prospective observational study aimed to evaluate the prevalence, clinical characteristics, and biochemical profile of CKD-associated pruritus among patients receiving maintenance hemodialysis at the Arrazi Hospital, Mohammed VI University Hospital Center in Marrakech. Pruritus severity was assessed using the Worst Itch Numerical Rating Scale (WI-NRS), while the impact on quality of life was evaluated using the Skindex-10 questionnaire. Demographic, clinical, and laboratory parameters including serum calcium, phosphorus, intact parathyroid hormone (iPTH), and C-reactive protein were analyzed. Among the 45 patients included, 29 (64.4%) presented with CKD-associated pruritus, most frequently with generalized distribution and severe intensity. Biological abnormalities related to mineral and bone metabolism, particularly hyperphosphatemia and secondary hyperparathyroidism, were frequently observed in affected patients. Pruritus was associated with a significant impairment in quality of life, with the majority of patients reporting moderate to severe psychosocial impact. Multimodal management including topical treatments, systemic therapies, and narrowband ultraviolet B (NB-UVB) phototherapy resulted in progressive improvement in symptom severity over a 12-week follow-up period. These findings highlight the substantial burden of CKD-associated pruritus in hemodialysis populations and underscore the importance of systematic screening and comprehensive multidisciplinary management to improve patient well-being.

**Keywords:** Chronic kidney disease; Hemodialysis; Chronic kidney disease–associated pruritus; Hyperphosphatemia; Secondary hyperparathyroidism; Quality of life; WI-NRS; Skindex-10.



## INTRODUCTION

Chronic kidney disease–associated pruritus (CKD-aP), historically referred to as uremic pruritus, remains one of the most debilitating yet under-recognized systemic manifestations in patients undergoing maintenance hemodialysis. Although often overshadowed by cardiovascular and metabolic complications of end-stage kidney disease (ESKD), contemporary evidence has redefined CKD-aP as a multidimensional disorder with significant pathogenic impact on clinical outcomes. Despite advances in dialysis techniques, the prevalence of CKD-aP remains high. Longitudinal data from the Dialysis Outcomes and Practice Patterns Study (DOPPS) Phase 7 (2021–2023) demonstrated a strong correlation between pruritus severity and adverse outcomes, including depression, severe sleep disruption, and increased all-cause mortality. CKD-aP continues to be underrecognized and undertreated. Studies indicate that healthcare providers may underestimate pruritus prevalence by up to 38%, partly because patients often normalize or underreport the symptom. In response, the 2024 kidney disease: Improving Global Outcomes (KDIGO) guidelines

recommend systematic screening and routine implementation of validated patient-reported outcome (PRO) measures to ensure timely detection and management. The objective of this study was to determine the prevalence of pruritus, characterize its clinical and biochemical profile, and assess its impact on quality of life in a cohort of 45 maintenance hemodialysis patients. Pruritus severity was evaluated using standardized instruments, including the Worst Itch Numerical Rating Scale (WI-NRS) and the Skindex-10 questionnaire.

## MATERIALS AND METHODS

This prospective, observational, analytical study was conducted between September 2024 and April 2025 at the Ibnou Tofail Center, Marrakech.

Inclusion criteria required patients to be ≥18 years of age and to have undergone maintenance hemodialysis for at least three months to ensure clinical and metabolic stability. Patients with primary dermatologic diseases, active systemic infections, or cognitive impairment preventing completion of self-reported questionnaires were excluded. Written informed consent was obtained from all participants, and the study adhered to the Declaration of Helsinki.

**Pruritus Assessment:**

Pruritus severity was measured using the WI-NRS, a validated single-item patient-reported instrument. Participants rated their worst itch over the previous 24 hours on an 11-point scale (0 = "no itch," 10 = "worst imaginable itch"). Scores were categorized as mild (1–3), moderate (4–6), or severe (≥7).

**Quality of Life Assessment:**

The psychosocial and functional impact of pruritus was evaluated using the Skindex-10 questionnaire, validated in hemodialysis populations. It assesses 10 items across three domains: disease-related concerns, emotional impact, and social functioning. Each item is scored 0–6, yielding a total score of 0–60, with higher scores indicating greater impairment.

**Clinical and Laboratory Parameters:**

Demographics and dialysis variables (age, sex, dialysis vintage, weekly session frequency) were obtained from records. Laboratory parameters included serum calcium, phosphorus, intact parathyroid hormone (iPTH), and C-reactive protein (CRP), focusing on CKD-MBD and systemic inflammation. Dialysis adequacy was assessed via Kt/V.

## RESULTS

**Demographics and Dialysis Characteristics:**

Out of the 45 maintenance hemodialysis patients screened, 29 met the diagnostic criteria for chronic kidney disease-associated pruritus (CKD-aP), indicating a prevalence of 64.4% within this single-center cohort. The affected group was characterized by a female predominance (62.1%, $n=18$) and a mean age of 65.1 years (range: 52–78 years). The average dialysis vintage was 4.8 years, with all patients receiving twice-weekly sessions. Onset of pruritic symptoms occurred at a mean of 2.7 years after initiating renal replacement therapy.

**Clinical Profile and Morphology:**

Pruritus was predominantly generalized, with 87.5% of patients reporting a diffuse distribution, while 12.5% presented with localized symptoms. The onset was reported as sudden in 16 cases (55.2%), and a chronic, persistent course was observed in 100% of the pruritic population. Secondary dermatological findings were frequent, as detailed in Table 1, with excoriations and linear scratch marks being the most prevalent.

**Symptom Severity and Quality of Life:**

The mean Worst Itch Numerical Rating Scale (WI-NRS) score was 7.6 ± 1.1, with individual scores ranging from 5 to 9, placing the majority of patients in the severe category. Evaluation of Health-Related Quality of Life (HRQoL) via the Skindex-10 demonstrated that 41.4% (n=12) of patients were highly affected, 34.5% (n=10) were moderately affected, and 24.1% (n=7) reported a mild impact.

**Biochemical Profile:**

Laboratory analysis identified high rates of mineral and bone disorder (CKD-MBD) markers among patients with itch. Hyperphosphatemia was identified in 75.0% of cases, and secondary hyperparathyroidism was present in 63.0%. Hypocalcemia was observed in 25.0% of the pruritic group.

**Management and Therapeutic Response:**

Management followed a multimodal approach. Topical medical treatment (emollients and dermocorticoids) was the primary intervention for was initiated for 22 patients (75.9%). Systemic pharmacological therapy (including gabapentin, antihistamines, or antidepressants) was administered to 24.1% (n=7), with all patients reporting a clinical response. Additionally, narrowband ultraviolet B (NB-UVB) phototherapy was utilized in 17.2% (n=5) of refractory cases, showing high tolerability and symptom reduction.

**Table 1: Clinical and Biochemical Characteristics**

| Parameter | Value |
|---|---|
| Age, years (mean, range) | 65.1 (52–78) |
| Male/Female | 11/18 |
| Dialysis duration, years (mean) | 4.8 |
| Dialysis frequency | Twice weekly |
| Time to pruritus onset, years | 2.7 |
| Diffuse distribution | 25 (87.5%) |
| Sudden onset | 16 (55.2%) |
| Excoriations / Scratch lesions | 22 (75.0%) |
| Prurigo nodules | 11 (37.5%) |
| Post-inflammatory hyperpigmentation | 4 (12.5%) |
| Hyperphosphatemia | 22 (75.0%) |
| Secondary hyperparathyroidism | 18 (63.0%) |
| Hypocalcemia | 7 (25.0%) |
| Mean WI-NRS score | 7.6 |
| Topical therapy | 22 (75.9%) |
| Systemic therapy | 7 (24.1%) |
| Phototherapy (NB-UVB) | 5 (17.2%) |

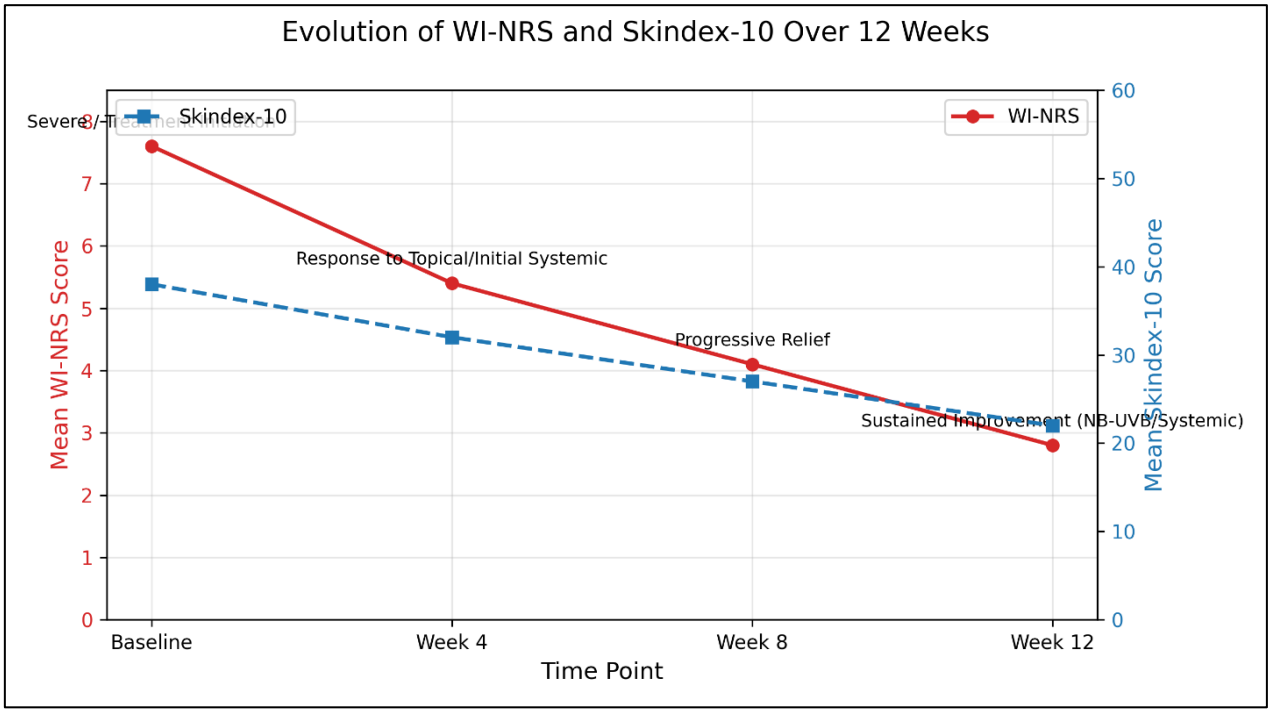


**Figure 1: Evolution of Pruritus Severity and Health-Related Quality of Life Over 12 Weeks**

*Line chart showing mean WI-NRS (red, left axis) and Skindex-10 (blue, right axis) scores. Clinical status annotated at each time point: Baseline (Severe/Treatment Initiation), Week 4 (Response to topical/initial systemic), Week 8 (Progressive Relief), Week 12 (Sustained Improvement).*

## DISCUSSION

Chronic kidney disease-associated pruritus (CKD-aP) remains one of the most pervasive and under-addressed systemic complications in the hemodialysis population. The prevalence of 64.4% observed in our series aligns with global estimates, which range from 20% to over 80%. Compared to the 2024 CENSUS-EU study, which reported a prevalence of 53.5%, our findings highlight a high symptomatic burden likely exacerbated by the universal twice-weekly dialysis schedule. Recent evidence suggests that patients on twice-weekly schedules are more prone to developing pruritus than those receiving thrice-weekly treatments due to inadequate clearance of protein-bound uremic toxins (PBUTs).

The biological profile of our pruritic patients reinforces the role of the CKD-Mineral and Bone Disorder (CKD-MBD) axis. The high prevalence of hyperphosphatemia (75.0%) and secondary hyperparathyroidism (63.0%) mirrors models where

calcium-phosphate crystal deposition in the dermis triggers sensory nerve endings. Although some large observational studies, such as DOPPS, have shown inconsistent correlations between serum phosphate and itch severity, our data support the hypothesis that rigorous control of the phosphate pool is a fundamental pillar of CKD-aP management.

The clinical impact on quality of life was profound, with over 75% of patients reporting moderate-to-high levels of impairment, correlating with the high mean WI-NRS score of 7.6.

Management demonstrated the efficacy of multimodal escalation. The symptomatic improvement—dropping from a WI-NRS of 7.6 to 2.8 at 12 weeks—parallels the results of Shabi *et al.,* (2024), where NB-UVB achieved high response rates in refractory patients. [1] The 2024 landscape emphasizes targeted therapies, such as difelikefalin, for patients not achieving meaningful reduction with conventional options. [2]

## CONCLUSION

Chronic kidney disease-associated pruritus is a major clinical challenge that significantly compromises quality of life. Our series confirms that itch severity is intimately linked to hyperphosphatemia and secondary hyperparathyroidism. Multimodal management, including phototherapy and systemic escalation, offers hope for refractory cases. Closing the diagnostic gap through proactive screening with the WI-NRS is essential to ensuring that these patients receive appropriate care.

### Additional Information

**Author Contributions:** All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

- **Concept and design:** Charafi Nouhaila, Markouk Oumaima, Nabil Hamouche, Mariam Chettati,Wafaa Fadili, Inass Laouad, Maryam Aboudourib,Leila Bendaoud, Ouafa Hocar, Said Amal
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### DISCLOSURES

- Human subjects: Consent was obtained or waived by all participants in this study. Marrakesh University Hospital Ethics Committee issued approval 12/2017.
- Animal subjects: All authors confirm that this study did not involve animal subjects or tissue.
- Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:
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  - Financial relationships: No financial relationships within the previous three years with any organization that might have an interest in the submitted work.
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