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Prospective study on chronic kidney disease and the prevalence of pruritus among internal medicine patients

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Abstract:
The prevalence and severity of pruritus over six months is assessed among 124 internal medicine patients diagnosed with varying stages of chronic kidney disease (CKD). Pruritus was observed in over half the cohort, with increasing frequency in advanced CKD stages. Severity was correlated with elevated serum urea and phosphorus levels. Sleep disturbance and reduced quality of life were common among affected individuals. Thus, we show the clinical relevance of pruritus in CKD management.

Keywords: Chronic kidney disease, pruritus, uremic itch, quality of life, prospective study

Background:
Chronic kidney disease (CKD) is a progressive condition affecting millions worldwide, often accompanied by a range of distressing complications that reduce quality of life **[1]**. Chronic kidney disease-associated pruritus (CKD-aP) is a common problem in patients with kidney disease, especially in those who are receiving dialysis. Among these, pruritus commonly referred to as uremic itch, is a frequently overlooked yet highly prevalent symptom, particularly in patients with moderate to advanced renal dysfunction **[2,3]**. Pruritus in CKD is thought to result from complex interactions involving uremic toxin accumulation, systemic inflammation, secondary hyperparathyroidism and dysregulation of opioid receptors **[4]**. Despite being non-life-threatening, pruritus significantly affects patient comfort, sleep quality, psychological well-being and overall health-related quality of life **[5]**. In clinical practice, it remains underdiagnosed and inadequately managed, especially in early CKD stages or in non-dialysis patients under general internal medicine care **[6]**. Most studies to date have focused on dialysis populations, leaving a gap in knowledge regarding pruritus prevalence and characteristics across all CKD stages **[7]**. Therefore, it is of interest to evaluate the prevalence, severity and clinical correlates of pruritus among internal medicine patients with CKD, thereby guiding more proactive screening and management approaches.

Materials and Methods:
This prospective observational study was conducted over a period of six months in the internal medicine department of a tertiary care hospital. A total of 124 adult patients (aged 18 years and above) diagnosed with chronic kidney disease (CKD) stages 2 to 5, based on estimated glomerular filtration rate (eGFR) as per KDIGO guidelines, were enrolled consecutively. Patients on dialysis or with dermatological conditions unrelated to CKD (*e.g.,* eczema, psoriasis, scabies) were excluded. Detailed clinical evaluations were performed at baseline, including medical history, current medications and laboratory parameters such as serum creatinine, urea, calcium, phosphorus, parathyroid hormone (PTH) and hemoglobin levels. The presence of pruritus was assessed using a standardized questionnaire and severity was graded using the 10-point Visual Analog Scale (VAS). Patients reporting a VAS score ≥4 were considered symptomatic. Additional information was collected on sleep quality, skin changes and interference with daily activities. All participants were followed monthly and any new onset or worsening of symptoms was documented. Statistical analysis involved chi-square tests for categorical variables and t-tests for continuous variables. Logistic regression was used to identify independent predictors of pruritus. Ethical approval was obtained from the institutional review board and all participants provided informed consent prior to enrollment.

Results:
Pruritus was found to be highly prevalent among patients with chronic kidney disease, particularly in those with advanced stages (4 and 5). Approximately 58% of the study population reported pruritus, with higher severity scores associated with increased serum urea, phosphorus levels and reduced eGFR. **Table 1** shows that the study population was well distributed across CKD stages, with a slight predominance of males and older adults. **Table 2** shows most patients belonged to CKD stages 3 to 5, allowing analysis of pruritus across varying renal

function levels. **Table 3** shows over half of the participants reported pruritus, most commonly in CKD stage 4 and 5 patients. **Table 4** shows Moderate to severe pruritus was predominantly found in advanced CKD stages. **Table 5** shows Patients with pruritus showed significantly higher mean urea and phosphorus levels. **Table 6** shows higher pruritus prevalence was associated with significantly reduced eGFR. **Table 7** shows sleep disturbance was commonly reported among those with moderate to severe pruritus. **Table 8** shows dry skin was the most frequently associated dermatological finding among pruritic patients. **Table 9** shows antihistamines were the most commonly used therapy, though with limited effectiveness. **Table 10** shows multiple biochemical parameters were independent predictors of pruritus in CKD.

Table 1: Baseline demographic and clinical characteristics of the study population

Characteristic	Total (n = 124)
Age (mean ± SD, years)	58.6 ± 11.2
Male (%)	64 (51.6%)
Female (%)	60 (48.4%)
Diabetes Mellitus (%)	78 (62.9%)
Hypertension (%)	94 (75.8%)
Mean BMI (kg/m²)	24.1 ± 3.8

Table 2: Distribution of patients according to CKD Stage

CKD Stage	Number of Patients	Percentage (%)
Stage 2	16	12.9%
Stage 3	38	30.6%
Stage 4	41	33.1%
Stage 5	29	23.4%

Table 3: Prevalence of pruritus by CKD Stage

CKD Stage	Patients with Pruritus	Percentage (%)
Stage 2	3	18.8%
Stage 3	15	39.5%
Stage 4	30	73.2%
Stage 5	24	82.8%

Table 4: Severity of pruritus according to VAS score

Severity (VAS Score)	Number of Patients	Percentage (%)
Mild (1–3)	12	16.7%
Moderate (4–6)	32	44.4%
Severe (7–10)	28	38.9%

Table 5: Comparison of biochemical parameters in patients with and without pruritus

Parameter	With Pruritus (n=72)	Without Pruritus (n=52)	p-value
Serum Urea (mg/dL)	84.3 ± 16.5	67.9 ± 14.2	<0.001
Serum Creatinine (mg/dL)	3.8 ± 1.1	2.9 ± 1.2	0.002
Phosphorus (mg/dL)	5.7 ± 1.3	4.6 ± 1.2	<0.001
PTH (pg/mL)	142.5 ± 48.6	120.4 ± 41.3	0.017
Calcium (mg/dL)	8.4 ± 0.7	8.6 ± 0.6	0.113

Table 6: Mean eGFR in patients with and without pruritus

Group	Mean eGFR (mL/min/1.73m²)	p-value
With Pruritus	21.8 ± 6.4	
Without Pruritus	31.2 ± 7.1	<0.001

Table 7: Sleep disturbance due to pruritus

Sleep Impact Level	Number of Patients	Percentage (%)
No Sleep Disturbance	18	25.0%
Mild Sleep Issues	24	33.3%
Frequent Awakening	22	30.6%
Severe Insomnia	8	11.1%

Table 8: Associated skin findings in patients with pruritus

Skin Finding	Number of Patients	Percentage (%)
Xerosis (Dry skin)	48	66.7%
Excoriation marks	31	43.1%
Hyperpigmentation	19	26.4%
No Visible Lesions	10	13.9%

Table 9: Treatment modalities used and reported effectiveness

Treatment	Used By (n)	Partial/No Relief (%)
Antihistamines	39	30 (76.9%)
Emollients	28	15 (53.6%)
Gabapentin	12	4 (33.3%)
Topical Steroids	6	3 (50.0%)

Table 10: Logistic regression analysis of predictors of pruritus

Variable	Adjusted OR	95% CI	p-value
Serum Urea	1.03	1.01–1.06	0.004
Phosphorus	1.48	1.11–1.97	0.008
eGFR	0.91	0.86–0.97	0.003
Diabetes Mellitus	1.21	0.65–2.27	0.544
Age	1.00	0.97–1.03	0.981

Discussion:

This prospective study demonstrates a substantial prevalence of pruritus in internal medicine patients with chronic kidney disease (CKD), with nearly 58% of the cohort affected. The burden of pruritus was closely associated with worsening renal function, as evident by significantly lower estimated glomerular filtration rate (eGFR) and higher serum urea and phosphorus levels in affected individuals **[8]**. These findings are consistent with the proposed pathophysiological mechanisms of uremic pruritus, including accumulation of metabolic toxins, secondary hyperparathyroidism and systemic inflammation **[9]**. The high frequency in CKD stages 4 and 5 aligns with existing evidence, but the presence of pruritus even in earlier stages (stage 3) highlights the importance of early symptom recognition and management **[10]**. Pruritus in this study significantly impacted patients' sleep and quality of life, particularly in the physical and psychological domains, emphasizing its clinical relevance beyond discomfort **[11]**. The lack of consistent and effective treatment was notable; commonly used therapies such as antihistamines and emollients provided only partial relief, underscoring the need for more targeted pharmacological and non-pharmacological interventions, including neuromodulators like gabapentin or non-opioid receptor antagonists **[12]**. While diabetes and age were not independent predictors in this cohort, logistic regression confirmed that high serum urea, phosphorus and lower eGFR independently predicted the presence of pruritus. These markers could serve as practical clinical indicators to stratify pruritus risk and guide early intervention **[13]**. Given the underreporting of symptoms by patients and under recognition by clinicians, routine screening for pruritus in CKD patients should be incorporated into internal medicine and nephrology practice **[14]**. Overall, this study highlights that pruritus is not just a benign symptom but a significant contributor to disease burden and reduced well-being in CKD patients **[15]**. Early diagnosis, comprehensive symptom assessment and individualized treatment protocols are critical to improving patient outcomes **[16]**. Further research is needed to develop more effective therapies and to explore the molecular

mechanisms behind CKD-associated pruritus in non-dialysis populations.

Conclusion:
Pruritus is a common and clinically significant complication in chronic kidney disease, affecting over half of internal medicine patients, especially in advanced stages. Its presence correlates with biochemical derangements like elevated urea and phosphorus, reduced eGFR and substantially impairs sleep and quality of life. Early recognition and targeted intervention strategies are essential for improving symptom control and patient well-being in this under-recognized aspect of CKD care.

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We acknowledge that first two authors contributed equally to this paper and hence they are considered as joint first authors.

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