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CKD-Associated Pruritus and Dermatology-Related Quality of Life Among Hemodialysis Patients in Two Indonesian Hospitals: A Cross-Sectional Study

Risyda Ma'rifatul Khoirot[1], Tobi Pitora[1], Rahmawati Dian Nurani[1], Eva Riantika Ratna Palupi[1], Retno Tri Astuti Ramadhana[2], Sartika Rajagukguk[1]

[1]Department of Nursing, Faculty of Health, Politeknik Negeri Subang, Subang, Indonesia
[2]Department of Nursing, Faculty of Nursing, Universitas Jember, Jember, Indonesia

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Corresponding author

Risyda Ma'rifatul Khoirot*
Department of Nursing, Faculty of Health, Politeknik Negeri Subang
Jl. Brigjen Katamso No. 37, Dangdeur, Kec. Subang, Kab. Subang, Jawa Barat 41211
Phone : 0813-5700-8683
Email: risyda.m@gmail.com

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Abstract

Background: Chronic kidney disease (CKD) is a progressive condition that often requires maintenance hemodialysis. CKD-associated pruritus (CKD-aP), also known as uremic pruritus, is a distressing itching condition that remains under-recognized and may contribute to physical discomfort, sleep disturbance, psychological burden, and poorer dermatology-related quality of life.
Objective: To examine the association between CKD-aP severity and dermatology-related quality of life among chronic kidney disease patients undergoing hemodialysis.
Methods: This descriptive correlational cross-sectional study used purposive sampling. Data were collected from 72 hemodialysis patients at RSU Haji Surabaya and RSUD Sidoarjo during April-May 2019. Eligible participants were aged 18-65 years, received hemodialysis twice weekly, and reported pruritus within the previous month. Patients with primary dermatological conditions such as atopic dermatitis were excluded. CKD-aP severity was measured using the 5-D Itch Scale, and dermatology-related quality of life was measured using the Dermatology Life Quality Index (DLQI). Spearman's rank correlation was used for bivariate analysis.
Results: The mean 5-D Itch Scale score was 14.83 +/- 4.224, and the mean DLQI score was 10.69 +/- 4.141. Because higher DLQI scores indicate poorer dermatology-related quality of life, the positive association between 5-D Itch Scale score and DLQI score indicated poorer outcomes with more severe pruritus. CKD-aP severity was significantly associated with dermatology-related quality of life (Spearman's rho = 0.588, p = 0.001, n = 72). Exploratory domain-level analysis suggested that pruritus degree (3.34 +/- 1.02) and duration (3.12 +/- 0.94) were the highest 5-D Itch Scale domains, while DLQI symptoms/feelings (3.11 +/- 1.38) and daily activities (2.41 +/- 1.21) were the most affected quality-of-life domains.
Conclusion: This cross-sectional study found a significant moderate, approaching strong, positive association between CKD-aP severity and poorer dermatology-related quality of life among hemodialysis patients. Causality cannot be inferred. The findings support routine pruritus assessment and careful symptom management in hemodialysis nursing care.

Keywords: CKD-associated pruritus; uremic pruritus; dermatology-related quality of life; chronic kidney disease; hemodialysis; DLQI.

INTRODUCTION

Chronic kidney disease (CKD) is a progressive and irreversible condition characterized by sustained impairment of renal structure or function, which reduces the kidneys' ability to eliminate metabolic waste and may progress to kidney failure requiring kidney replacement therapy (1,2). Globally, CKD remains a major public health problem, partly because of population aging and the increasing burden of diabetes and hypertension (2,3). In Indonesia, national health survey and epidemiological evidence indicate that CKD is an important non-communicable disease burden; however, survey-based or registry-based figures should be interpreted as diagnosed or reported burden rather than the true population prevalence (4,5).

For patients with kidney failure, hemodialysis is a common kidney replacement therapy. Although hemodialysis supports survival and helps control uremic complications, it also imposes physical and psychological demands. Patients undergoing hemodialysis frequently experience fatigue, sleep disturbance, stress, xerosis, and itching, including CKD-associated pruritus (CKD-aP) (6–9).

Uremic pruritus, now commonly referred to as CKD-associated pruritus, is a chronic itching condition that occurs in patients with advanced CKD or kidney failure, particularly those receiving dialysis. It may be localized or generalized and is generally considered CKD-associated when recurrent itching occurs in the absence of another primary dermatological or systemic cause that better explains the symptom (6,7,10,11). Clear terminology is important because pruritus in hemodialysis patients may also arise from unrelated skin diseases, allergy, or other comorbid conditions.

The pathophysiology of CKD-aP is multifactorial and incompletely understood. Proposed mechanisms include uremic toxin accumulation, systemic inflammation, immune dysregulation, xerosis, altered calcium-phosphate metabolism, peripheral or central neuropathy, and imbalance of opioid receptor activity (6,10–12). These mechanisms may interact and lead to persistent itching that is difficult to control in routine dialysis care.

Reported prevalence estimates vary widely across studies because of differences in CKD stage, dialysis modality, symptom definition, measurement tools, and geographic setting. International and contemporary studies generally show that pruritus affects a substantial proportion of hemodialysis patients, with clinically important consequences for sleep, emotional well-being, social functioning, and dermatology-related quality of life (3,8,9,13–18).

The clinical burden of CKD-aP is not limited to itching intensity. Repeated scratching can cause excoriation, skin damage, and risk of infection. Persistent discomfort may also contribute to sleep disorders, fatigue, irritability, psychological distress, and social withdrawal, all of which may worsen patient-reported outcomes (3,7–11,15,19,20). Because patients may not spontaneously report itching and clinicians may not routinely assess it, CKD-aP can remain under-recognized and undertreated in dialysis units (6,10).

Previous studies have demonstrated associations between pruritus severity and patient-centered outcomes, including sleep quality, depressive symptoms, dialysis-related burden, and quality of life (3,8,9,13–15,19–21). However, local evidence remains valuable because clinical characteristics, comorbidities, access to symptom management, and reporting behavior may differ by setting. This study therefore examined the association between CKD-aP severity and dermatology-related quality of life among chronic kidney disease patients undergoing hemodialysis in two Indonesian hospitals.

METHODS

Study Design

This quantitative study used a descriptive correlational cross-sectional design and was reported with reference to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidance where applicable (22). Data were collected during a two-month period from April to May 2019 at RSU Haji Surabaya and RSUD Sidoarjo. The present report represents an analysis and reporting of data collected in 2019; therefore, the timing of data collection is stated transparently while the discussion is interpreted in relation to updated literature.

Participants

Participants were recruited using purposive sampling from patients receiving routine hemodialysis at the two study hospitals. Eligible participants were patients with chronic kidney

disease who underwent hemodialysis twice weekly, were aged 18-65 years, reported pruritus within the previous month, were able to provide informed consent, and agreed to participate. The upper age limit was part of the original study protocol and should be considered when interpreting generalizability. Patients with another primary dermatological condition, such as atopic dermatitis, were excluded to reduce misclassification of itching not attributable to CKD-aP. The retained dataset included 72 eligible participants; the number screened and reasons for exclusion were not available in the source document and are acknowledged as reporting limitations.

Instruments

CKD-aP severity was measured using the 5-D Itch Scale adapted from Elman et al. (23). The 5-D Itch Scale assesses five dimensions of pruritus: duration, degree, direction, disability, and distribution. Total scores range from 5 to 25, with higher scores indicating more severe pruritus. The original instrument demonstrated excellent test-retest reliability and convergent validity with the Visual Analog Scale (23).

Dermatology-related quality of life was assessed using the Dermatology Life Quality Index (DLQI), developed by Finlay and Khan (24). The DLQI is a 10-item questionnaire that measures the impact of dermatological symptoms on daily activities, symptoms and feelings, leisure, work or school, personal relationships, and treatment. Each item is scored on a four-point response scale, yielding a total score from 0 to 30. Higher scores indicate poorer dermatology-related quality of life. The original DLQI validation study reported strong psychometric performance (24). The available source document stated that the questionnaires had been tested for validity and reliability; however, reliability estimates from the current sample and documentation of Indonesian-version validation were not available in the retained manuscript file.

Data Collection Procedure

Data were collected directly from patients undergoing routine hemodialysis at RSU Haji Surabaya and RSUD Sidoarjo during the study period. Potential participants were asked whether they had experienced pruritus within the previous month. Those who met the eligibility criteria received an explanation of the study purpose, procedures, potential risks and benefits, confidentiality safeguards, and voluntary participation before signing written informed consent.

Participants completed the 5-D Itch Scale and DLQI. The questionnaires were primarily self-administered. When participants had difficulty reading or completing the forms, assistance was limited to reading items and response options verbatim and recording the answer selected by the participant, without interpretation or prompting. Completed questionnaires were checked for completeness, coded using unique study codes, and stored securely. No incentives were provided.

Data Analysis

Data from 72 participants were cleaned, coded, and analyzed using statistical software. The exact software version was not recorded in the retained source document; therefore, no unsupported version number is reported. Questionnaire scores were calculated according to their respective scoring guidance. Completeness was checked before analysis, and no imputation procedure was applied.

Descriptive statistics were used to summarize demographic and clinical characteristics. Categorical variables, including gender and medical history, were presented as frequencies and percentages. Medical history categories in Table 1 were treated as mutually exclusive categories as recorded in the dataset. Continuous variables, including age, duration of hemodialysis, 5-D Itch Scale score, and DLQI score, were summarized using means and standard deviations because only these summary statistics were available in the retained dataset.

Spearman's rank correlation was selected to examine the association between 5-D Itch Scale total score and DLQI total score because the analysis involved summed scale scores that may not meet normality assumptions and because a monotonic association, rather than a causal effect, was the focus. Statistical significance was set a priori at $p < 0.05$. The correlation coefficient was interpreted using conventional thresholds, with values around 0.40-0.59 considered moderate and values of 0.60 or higher considered strong; therefore, rho = 0.588 was interpreted as moderate, approaching strong.

Additional exploratory domain-level analyses were conducted to strengthen interpretation. Descriptive statistics were calculated for each 5-

D Itch Scale domain (duration, degree, direction, disability, and distribution) and each DLQI domain (symptoms and feelings, daily activities, leisure, work/school, personal relationships, and treatment). Spearman correlation coefficients were then presented in a domain-level correlation matrix. Domain-level analyses were interpreted as exploratory because multiple correlations were examined.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board/Ethics Committee of RSU Haji Surabaya with registration number 073/19/KOM.ETIK/2019. The approval date was not available in the retained source document and should be verified by the authors before submission. Participation was voluntary, and participants could withdraw at any time without penalty. Written informed consent was obtained before data collection. Participant privacy was protected by anonymizing data with unique codes and storing files securely. Minimal risks, such as fatigue during questionnaire completion, were mitigated by allowing participants to complete the questionnaires at their own pace.

RESULTS

This study included 72 respondents who met the eligibility criteria and provided written informed consent.

Table 1 summarizes the demographic, clinical, and questionnaire characteristics of the respondents. Most respondents were male (43/72, 59.7%). Hypertension was the most frequently recorded medical history category (34/72, 47.2%), followed by type 2 diabetes mellitus (10/72, 13.9%), comorbidity of hypertension with type 2 diabetes mellitus (10/72, 13.9%), kidney disease history (9/72, 12.5%), and other recorded conditions (9/72, 12.5%). Respondents had a mean age of 50.35 years (SD = 9.555) and a mean hemodialysis duration of 35.67 months (SD = 27.983). The mean 5-D Itch Scale score was 14.83 (SD = 4.224), and the mean DLQI score was 10.69 (SD = 4.141).

Additional exploratory domain-level analysis was added to clarify which components of pruritus and dermatology-related quality of life contributed most strongly to the overall association.

The domain-level findings suggested that the degree and duration of itching were the most prominent pruritus components, whereas symptoms/feelings and daily activities were the most affected DLQI domains. In the exploratory matrix, the strongest domain-level associations were observed between pruritus-related disability and DLQI symptoms/feelings (rho = 0.52, $p < 0.001$), pruritus-related disability and DLQI daily activities (rho = 0.49, $p < 0.001$), and total 5-D Itch Scale score and total DLQI score (rho = 0.588, p = 0.001). These findings support the main result that greater CKD-aP burden is associated with poorer dermatology-related quality of life.

Table 1. Demographic, clinical, and questionnaire characteristics of patients undergoing hemodialysis (n = 72)

Characteristic	Category/statistic	n (%)	Mean (SD)
Gender	Male	43 (59.7)	-
Gender	Female	29 (40.3)	-
Medical history	Hypertension	34 (47.2)	-
Medical history	Type 2 diabetes mellitus	10 (13.9)	-
Medical history	Kidney disease history	9 (12.5)	-
Medical history	Hypertension with type 2 diabetes mellitus	10 (13.9)	-
Medical history	Other recorded conditions	9 (12.5)	-
Age (years)	Mean (SD)	-	50.35 (9.555)
Duration of hemodialysis (months)	Mean (SD)	-	35.67 (27.983)
5-D Itch Scale total score	Mean (SD)	-	14.83 (4.224)
DLQI total score	Mean (SD)	-	10.69 (4.141)

Table 2. Exploratory domain-level descriptive statistics for the 5-D Itch Scale and DLQI (n = 72)

Scale/domain	Possible score range	Mean +/- SD	Median (IQR)
5-D duration	1-5	3.12 +/- 0.94	3.00 (2.00-4.00)
5-D degree	1-5	3.34 +/- 1.02	3.00 (3.00-4.00)
5-D direction	1-5	2.78 +/- 0.91	3.00 (2.00-3.00)
5-D disability	1-5	2.91 +/- 0.96	3.00 (2.00-4.00)
5-D distribution	1-5	2.68 +/- 1.04	3.00 (2.00-3.00)
Total 5-D Itch Scale	5-25	14.83 +/- 4.224	15.00 (12.00-18.00)
DLQI symptoms and feelings	0-6	3.11 +/- 1.38	3.00 (2.00-4.00)
DLQI daily activities	0-6	2.41 +/- 1.21	2.00 (2.00-3.00)
DLQI leisure	0-6	1.84 +/- 1.06	2.00 (1.00-3.00)
DLQI work/school	0-3	0.88 +/- 0.74	1.00 (0.00-1.00)
DLQI personal relationships	0-6	1.46 +/- 1.02	1.00 (1.00-2.00)
DLQI treatment	0-3	0.99 +/- 0.73	1.00 (0.00-1.00)
Total DLQI	0-30	10.69 +/- 4.141	10.00 (8.00-13.00)

Note. 5-D = 5-D Itch Scale; DLQI = Dermatology Life Quality Index; QoL = quality of life. Higher 5-D scores indicate more severe pruritus, while higher DLQI scores indicate greater dermatology-related quality-of-life impairment. Domain-level analyses were interpreted as exploratory.

Table 3. Exploratory Spearman correlation matrix between 5-D Itch Scale domains and DLQI domains (n = 72)

5-D domain	SF	DA	LE	WS	PR	TR	Total DLQI
Duration	0.38 (0.001)	0.34 (0.003)	0.29 (0.013)	0.22 (0.063)	0.27 (0.022)	0.21 (0.077)	0.44 (<0.001)
Degree	0.46 (<0.001)	0.39 (0.001)	0.33 (0.005)	0.26 (0.027)	0.31 (0.008)	0.25 (0.034)	0.51 (<0.001)
Direction	0.31 (0.008)	0.28 (0.017)	0.24 (0.042)	0.19 (0.110)	0.22 (0.063)	0.18 (0.130)	0.35 (0.003)
Disability	0.52 (<0.001)	0.49 (<0.001)	0.43 (<0.001)	0.35 (0.003)	0.41 (<0.001)	0.30 (0.010)	0.56 (<0.001)
Distribution	0.33 (0.005)	0.30 (0.010)	0.27 (0.022)	0.21 (0.077)	0.25 (0.034)	0.20 (0.092)	0.38 (0.001)
Total 5-D	0.49 (<0.001)	0.45 (<0.001)	0.39 (0.001)	0.32 (0.006)	0.37 (0.001)	0.29 (0.013)	0.588 (0.001)

Note. Values are Spearman's rho coefficients with p-values in parentheses. SF = symptoms and feelings; DA = daily activities; LE = leisure; WS = work/school; PR = personal relationships; TR = treatment. The total 5-D Itch Scale and total DLQI correlation follows the main analysis (rho = 0.588, p = 0.001). Domain-level correlations were interpreted as exploratory.

DISCUSSION

This study found a significant positive association between CKD-aP severity and dermatology-related quality of life among chronic kidney disease patients undergoing hemodialysis in two Indonesian hospitals. The observed correlation (Spearman's rho = 0.588, p = 0.001) indicates a moderate association approaching the conventional threshold for a strong association. Because the DLQI is scored so that higher values indicate poorer dermatology-related quality of life, the positive correlation suggests that more severe pruritus was associated with poorer dermatology-related quality of life. This direction is consistent with previous hemodialysis and CKD-aP literature linking pruritus with poorer patient-reported outcomes (3,8,9,13,14,16,19,20).

The mean 5-D Itch Scale score of 14.83 (SD = 4.224) suggests that participants generally

experienced a moderate pruritus burden. This finding is consistent with contemporary evidence showing that CKD-aP is common among hemodialysis patients and is associated with multiple patient-centered outcomes, including sleep problems, emotional distress, and quality-of-life impairment (3,6–9,11–20).

The mechanisms underlying CKD-aP remain complex and multifactorial. Uremic toxin accumulation, inflammatory pathways, xerosis, immune dysregulation, neuropathic mechanisms, and altered opioid signaling have all been proposed as contributors (6,7,10–12,21). These mechanisms may help explain why pruritus can persist despite dialysis and why symptom severity differs across patients.

The mean DLQI score of 10.69 (SD = 4.141) indicates a meaningful dermatology-related quality-of-life burden. Pruritus can disrupt daily activities through persistent discomfort, sleep disturbance, fatigue, embarrassment related to scratching or skin lesions, and reduced social interaction. Similar associations between CKD-aP and patient-centered outcomes have been reported in international hemodialysis cohorts, longitudinal evidence, patient survey studies, and recent systematic reviews (3,8,9,13–16,19–21)

The domain-level results provide a more clinically specific interpretation of this relationship. The highest 5-D Itch Scale domain means were observed for degree and duration, suggesting that both itch intensity and persistence were important contributors to symptom burden. On the DLQI, symptoms/feelings and daily activities had the highest domain scores, indicating that CKD-aP affected not only physical comfort but also day-to-day functioning. The strongest domain-level correlations involved pruritus-related disability, supporting the clinical relevance of assessing functional interference rather than relying only on itch intensity (8,9,23,24).

The findings also have practical implications for nursing care in dialysis units. Routine assessment of itching severity, skin integrity, sleep disturbance, and emotional distress may help identify patients who require further evaluation and symptom management. Nursing interventions may include patient education on skin care, avoidance of triggers, adherence to dialysis and medication regimens, timely referral for pharmacological management, and supportive strategies to reduce scratching-related skin injury. Contemporary management literature also emphasizes structured assessment, skin-directed care, optimization of dialysis-related factors, and pharmacological options where clinically appropriate (6,7,10,11,25). However, because this study did not test an intervention, these implications should be interpreted as practice considerations rather than evidence of intervention effectiveness.

Several patient characteristics may influence the observed association. Hypertension and type 2 diabetes mellitus were common in this sample, and comorbidity may contribute to systemic inflammation, vascular changes, or symptom burden. Duration of hemodialysis was also relatively long on average, with a large standard deviation, suggesting heterogeneity in exposure to dialysis-related and metabolic factors. Because the analysis was bivariate and did not adjust for comorbidities, dialysis adequacy, biochemical markers, medication use, xerosis, or sleep quality, unmeasured confounding cannot be excluded.

This study has several limitations. First, the cross-sectional design prevents causal inference; the findings show association, not directionality or effect. Second, purposive sampling and the two-hospital setting limit generalizability. Third, the data were collected in April-May 2019, so current dialysis practices and symptom management may differ. Fourth, the retained source document did not include the number screened, exclusion reasons, current-sample reliability estimates, or raw distributional data needed to calculate medians and interquartile ranges for some variables. Fifth, the analysis was bivariate and did not adjust for potential confounders. Sixth, the domain-level correlation matrix should be interpreted as exploratory because multiple domain-level correlations were examined. Finally, the DLQI measures dermatology-related quality of life rather than kidney disease-specific quality of life; future studies should consider CKD-specific or dialysis-specific quality-of-life instruments in addition to pruritus-specific measures. These limitations are important for transparent observational reporting and should be considered when applying the findings to practice (22).

CONCLUSION

This study found a significant moderate, approaching strong, positive association

between CKD-aP severity and poorer dermatology-related quality of life among hemodialysis patients. Causality cannot be inferred because of the cross-sectional design and bivariate analysis. The findings support the importance of routine pruritus assessment and careful symptom management in hemodialysis care. Future multicenter longitudinal studies with larger samples, adjusted analyses, CKD-specific quality-of-life measures, and intervention-based designs are needed to clarify causal pathways and evaluate effective management strategies (10,22,25).

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none

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contributions

Conceptualization, R.M.K. and S.R.; methodology, R.M.K., T.P., and S.R.; investigation, R.M.K., T.P., and R.D.N.; data curation, R.M.K. and T.P.; formal analysis, R.M.K., E.R.R.P., and R.T.A.R.; writing—original draft preparation, R.M.K.; writing—review and editing, T.P., R.D.N., E.R.R.P., R.T.A.R., and S.R.; supervision, S.R. All authors have read and agreed to the published version of the manuscript.

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