



Utility of a Single Itch-Related Question and the Skindex-10 Questionnaire for Assessing Pruritus and Predicting Health-Related Quality of Life in Patients Receiving Hemodialysis

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Rationale & Objective: Chronic kidney disease-associated pruritus has been linked with poorer mental and physical health-related quality of life (HR-QOL) in patients receiving hemodialysis. We used the Skindex-10 questionnaire and a single itch-related question to evaluate their prediction of HR-QOL.

Study Design: Prospective, international cohort.

Setting & Participants: We analyzed data from 4,940 patients receiving hemodialysis from 17 countries enrolled in phase 5 (2013) of the Dialysis Outcomes and Practice Patterns Study.

Predictors: The responses to the 10 questions of Skindex-10 (0-6 scale) pertaining to itchiness in the past week were summed to create a summary score (range, 0-60). Concurrently, a single question from the Kidney Disease Quality of Life 36-item survey asked "during the past 4 weeks, to what extent were you bothered by itchy skin?" with 5 responses, ranging from "not at all" to "extremely" bothered.

Outcomes: Physical component summary (PCS) and mental component summary (MCS) scores of HR-QOL.

Analytical Approach: We used separate linear regression models to evaluate the predictive power, based on R^2 values, for 3 models: 1 for each predictor and 1 with both predictors.

Results: The correlation between the single itch-related question and the Skindex-10 score was 0.72. A 10-point higher Skindex-10 score was associated with a 1.2-point lower PCS score (95% CI, -1.4 to -0.9) and a 1.5-point lower MCS score (95% CI, -1.7 to -1.3). The R^2 value for PCS was 0.065 when the single question was used and only 0.033 when Skindex-10 was used as the predictor; the R^2 value for MCS was 0.056 for the single question versus 0.052 for Skindex-10.

Limitations: Measurement bias and translation issues in the questionnaires.

Conclusions: The single question about the extent to which the patients were bothered by itchy skin was highly correlated with the Skindex-10 score and at least as predictive of key HR-QOL measures. In daily clinical practice, using 1 simple question about the extent to which patients are bothered by itchy skin can be a feasible and efficient method for the routine assessment of pruritus.

Visual Abstract included

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Chronic kidney disease (CKD)-associated pruritus is a burdensome and highly prevalent condition, associated with poorer quality of life^{1,2}; poor quality of sleep; psychologic conditions, including clinical depression³; and an increased risk of mortality.⁴ The prevalence estimates for CKD-associated pruritus range from 40% to 60% in patients receiving hemodialysis (HD) across countries.⁵ Among patients with CKD-associated pruritus receiving HD, 84% experienced itching daily or almost daily and 59% reported being bothered for >1 year.⁶ However, to evaluate the impact of itch, these studies used questionnaires that are not a part of nephrologists' routine assessment of patients.

The Skindex questionnaires were developed as a reliable and valid instrument to measure the effects of skin disease on the quality of life and may supplement clinical judgments of the severity of the disease. Although the original Skindex questionnaires had at least 16 questions, the first longitudinal study that evaluated CKD-associated pruritus used a 10-question instrument (Skindex-10), with relevant

subdomains for patients in the HD setting,⁶ and showed that among patients with moderate-to-severe CKD-associated pruritus receiving HD, changes of $\geq 20\%$ in the Skindex-10 scores were associated with reductions in health-related quality of life (HR-QOL) measures. Other studies using only a single itch-related question from the validated and widely used Kidney Disease Quality of Life 36-item survey (KDQOL-36) to assess self-reported CKD-associated pruritus showed that CKD-associated pruritus was strongly associated with a worse quality of life^{1,7} and the symptoms of depression.^{3,8}

CKD-associated pruritus is underreported, underestimated, and undertreated^{5,9,10}; in dialysis facilities where 21%-50% of patients reported having severe CKD-associated pruritus, only 1% of medical directors estimated this same prevalence.^{1,5} Although treatment is not well established in guidelines, an observational study reported that gabapentin or pregabalin relieved itching in 85% of 71 consecutively treated patients with CKD.¹¹⁻¹³ Nonetheless, patients are most often prescribed an

PLAIN-LANGUAGE SUMMARY

Chronic kidney disease (CKD)-associated pruritus is highly prevalent, associated with poorer health-related quality of life, and often underdiagnosed in the dialysis setting. We explored 2 CKD-associated pruritus instruments—a single question from the Kidney Disease Quality of Life 36-item survey, which asked the extent to which patients were bothered by itchy skin, and the 10-question Skindex-10 survey—and found that the responses were strongly correlated. Further, the prediction of physical and mental health-related quality of life summary scores was as strong—and in some cases, stronger—when the single CKD-associated pruritus question was used versus when Skindex-10 was used. In daily clinical dialysis practice, the use of 1 simple question about the extent to which patients are bothered by itchy skin can be a feasible and efficient method for routinely screening for pruritus.

antihistamine or corticosteroid rather than gabapentin or other agents shown to have an antipruritic action (eg, nalfurafine; only approved in Japan and South Korea).

Creating a simpler approach for the routine assessment of CKD-associated pruritus could help identify more previously undiagnosed cases, potentially leading to more widespread treatment. In this study, we measured the extent to which patients are bothered by CKD-associated pruritus, using a single itch-related question versus the 10-item Skindex-10 questionnaire; the correlation between these 2 approaches for measuring CKD-associated pruritus; and the proportion of variance in HR-QOL measures that can be explained by the single itch-related question versus the Skindex-10 score. These analyses sought to inform whether a simpler approach, based on a single itch-related question, is comparable with the more elaborate Skindex-10 questionnaire for assessing the severity of pruritus and its impact on key HR-QOL outcomes; if so, this may help to facilitate the use of a single itch-related question for routinely screening for CKD-associated pruritus in the dialysis setting.

METHODS

Data Source

The analyses were based on data from patients receiving HD from 17 countries enrolled during the second year of phase 5 (2013) of the Dialysis Outcomes and Practice Patterns Study (DOPPS): Belgium, Canada, Germany, the Gulf Cooperation Council (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates), Italy, Japan, Russia, Spain, Sweden, Turkey, the United Kingdom, and the United States. The design, details, and objectives of DOPPS have been previously published.¹⁴ DOPPS was approved by national and/or local ethics committees, and

patient consent was obtained, as required by local ethics regulations. Data on demographic characteristics, comorbid conditions, and laboratory values were obtained from the patients' records. The participants were asked to complete a patient questionnaire, which included the Skindex-10 questionnaire, other self-reported HR-QOL measures based on validated instruments regarding the symptoms of CKD (including CKD-associated pruritus), and KDQOL-36.¹⁵

Predictors

The exposure of interest was the impact of itch, captured using the DOPPS patient questionnaire and measured via 2 distinct approaches: (1) based on 10 questions, using the Skindex-10 score; and (2) based on a single itch-related question included in KDQOL-36. The Skindex-10 (Table S1) scores were calculated as per Mathur et al⁶: the responses to each of the 10 questions (0-6 scale per question) pertaining to how often the patients were bothered by itchy skin in the past week, were summed to create a total summary score (range, 0-60; with 0 indicating not at all bothered) and 3 subdomain scores (ie, itching [disease] and its impact on mood or emotions and social functioning).

The single itch-related question included in KDQOL-36 asked “during the past 4 weeks, to what extent were you bothered by itchy skin?” The response options were “not at all bothered,” “somewhat bothered,” “moderately bothered,” “very much bothered,” and “extremely bothered.”

HR-QOL Outcomes

Data on HR-QOL outcomes were also collected using the KDQOL-36 questionnaire, which combines both general HR-QOL measures and kidney-specific domains.¹⁵ The items were summarized to yield mental component summary (MCS) and physical component summary (PCS) scores using algorithms by Ware et al,¹⁶ along with separate summary scores for the burden and effects of kidney disease. We did not analyze the subscale of symptoms because the single itch-related question regarding CKD-associated pruritus was included in that subscale.

Analytical Approach

In this cross-sectional analysis, data on both the predictors (CKD-associated pruritus) and outcomes (HR-QOL) were concurrently collected using the self-administered patient questionnaire. To understand the relationship between the 2 approaches for the assessment of CKD-associated pruritus, the Spearman correlation coefficient was calculated between Skindex-10 (total score and scores for each of its 3 domains) and the single itch-related question. The internal consistency was assessed using the Cronbach alpha value of the correlation of the patients' responses to individual Skindex-10 questions with its overall score and each of its domains (ie, social, emotional, and functional).

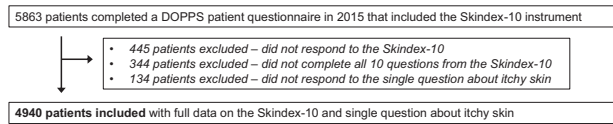


Figure 1. Consort diagram indicating the construction of the patient population for the study. Abbreviation: DOPPS, Dialysis Outcomes and Practice Patterns Study.

To analyze the association between CKD-associated pruritus and HR-QOL, separate, unadjusted linear regression models were used for each of the 4 continuous HR-QOL outcomes and included as predictors: (1) the Skindex-10 score; (2) the single itch-related question, and (3) both measures of CKD-associated pruritus. We evaluated the predictive powers of the 3 models using their respective R^2 values.

All the analyses were performed using the SAS software, version 9.4 (SAS Institute). A central institutional review board (Ethical and Independent (E&I) Review Services) approved the study. We obtained additional study approvals and informed patient consent, as required by national and local ethics regulations.

RESULTS

Descriptive Data

The study sample consisted of 4,940 patients who completed both the single itch-related question and the Skindex-10 questionnaire. We excluded 445 patients who did not complete the Skindex-10 questionnaire, 344 patients who did not fully answer all the Skindex-10 questions, and 134 patients who had missing values for the single itch-related question. The composition of the study sample as well as the numbers and reasons for exclusion are shown in Fig 1.

With regard to the single itch-related question, which reflected the extent to which the patients were bothered by itchy skin in the past 4 weeks, 37% of the patients were “not at all” bothered, 29% were “somewhat bothered,” and 16% were “very much or extremely bothered” (Fig 2A). The proportion of patients who were at least moderately bothered by itchy skin, determined based on the single itch-related question, ranged from 23% in Germany to 51% in the United Kingdom (Fig 2A). With regard to Skindex-10, which reflected the extent to which the patients were bothered by itchy skin in the past week, 55% had a score of 0 (ie, indicating that they were never bothered by itchy skin; Fig 2B). The proportion of patients with a Skindex-10 score of >0 ranged from 30% in Italy to 56% in the United Kingdom (Fig 2B). The comparisons among the countries were similar when the single itch-related question was used (Fig 2A) versus when the Skindex-10 score was used (Fig 2B). When the analysis was restricted to patients who were bothered by itchy skin (ie, 45% of patients with a Skindex-10 score of >0), the median Skindex-10 score was 26 (interquartile range, 15-37)

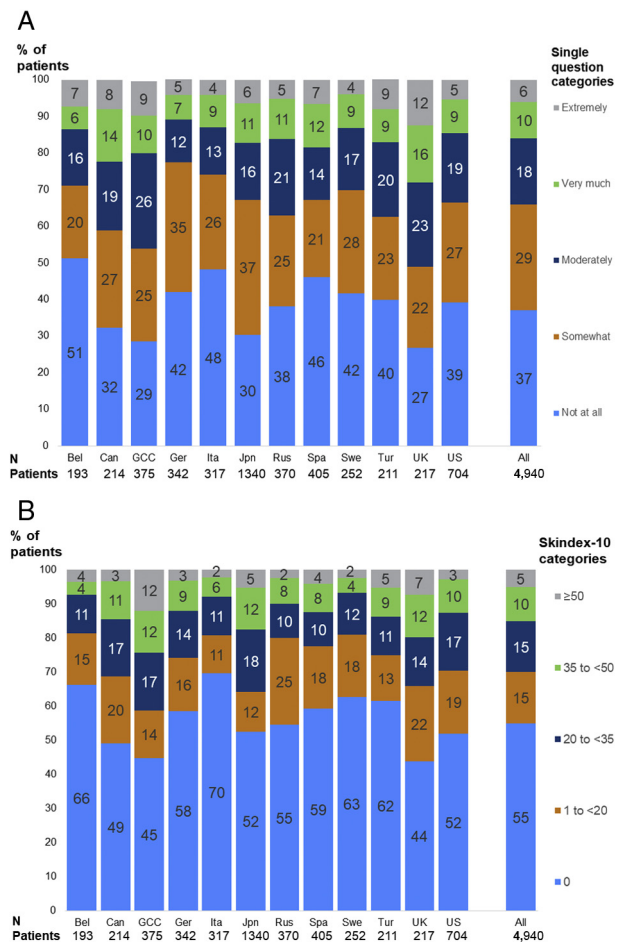


Figure 2. (A) Distribution of the extent to which the patient is bothered by itchy skin (single itch-related question) by country. (B) Distribution of Skindex-10 scores by country. The numbers may not sum to 100 because of rounding. The response options range from 0 (never bothered) to 6 (always bothered). The score ranges from 0 to 60, with higher scores indicating being bothered more often by itch. The Gulf Cooperation Council countries include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Abbreviations: Bel, Belgium; Can, Canada; GCC, Gulf Cooperation Council; Ger, Germany; Ita, Italy; Jpn, Japan; Rus, Russia; Spa, Spain; Swe, Sweden; Tur, Turkey; UK, United Kingdom; US, United States.

and ranged from 17 (interquartile range, 11-32) in Russia to 33 (interquartile range, 19-48) in the Gulf Cooperation Council (Fig 3).

The patient characteristics based on the severity of CKD-associated pruritus are shown in Tables 1 (based on the single itch-related question) and 2 (based on the categories of the Skindex-10 scores). Patients who reported a more bothersome itch in the single itch-related question were more likely to have had a diagnosis of diabetes (51% for those extremely bothered vs 38% for those not at all bothered by itchy skin), coronary artery disease (36% vs 28%, respectively), heart failure (24% vs 17%, respectively), cirrhosis (3% vs 1%, respectively), or lung disease

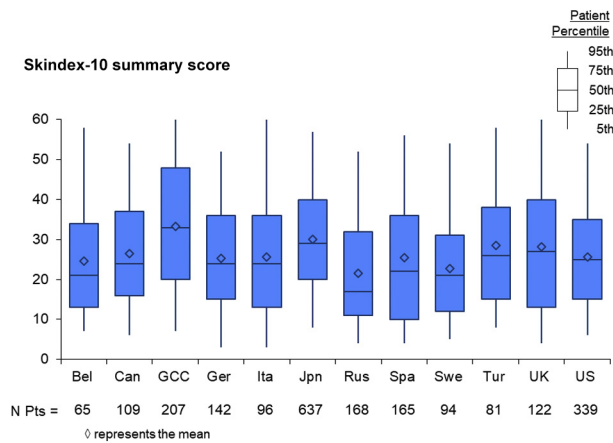


Figure 3. Distribution of Skindex-10 scores, excluding 0 scores, by country. Only patients with a Skindex-10 score of >0 were considered; n = 2,225. The Gulf Cooperation Council countries include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Abbreviations: Bel, Belgium; Can, Canada; GCC, Gulf Cooperation Council; Ger, Germany; Ita, Italy; Jpn, Japan; Pts, patients; Rus, Russia; Spa, Spain; Swe, Sweden; Tur, Turkey; UK, United Kingdom; US, United States.

(13% vs 9%, respectively). The mean albumin level was lower for those extremely bothered (3.6 g/dL) versus those not at all bothered (3.8 g/dL) by itchy skin. Similar differences were observed across the categories of the Skindex-10 scores.

Skindex-10 Instrument

The Skindex-10 questionnaire showed a high internal consistency, indicated by Cronbach alpha values of >0.83 for all 10 questions (Table S2). The internal consistency with the overall Skindex-10 score was higher for the emotional domain (Cronbach alpha, 0.91-0.93), followed by that for the disease (Cronbach alpha, 0.90-0.91) and social domains (Cronbach alpha, 0.83-0.86). Within the domains, the Cronbach alpha values ranged from 0.92 to 0.97 for the 3 questions in the disease domain, 0.93 to 0.97 for the 3 questions in the emotional domain, and 0.92 to 0.94 for the 4 questions in the social domain.

Comparison of Skindex-10 Scores With the Single Itch-Related Question

Among the 2,128 patients who indicated that they were at least somewhat bothered by itchy skin in both the single

Table 1. Patient Characteristics Based on a Single Itch-Related Question Asking About the Extent to Which Bothered by Itchy Skin in the Past 4 Weeks

Characteristics	Extent Bothered by Itchy Skin				
	Not At All	Somewhat	Moderately	Very Much	Extremely
Number of patients (%)	1,827 (37%)	1,423 (29%)	863 (17%)	507 (10%)	320 (6%)
Demographics					
Age	62.7 (14.8)	62.6 (14.3)	62.9 (14.3)	63.3 (14.4)	63.5 (15.5)
HD vintage, y	2.7 (0.8-6.3)	3.3 (1.1-7.6)	3.0 (0.9-6.3)	2.5 (0.7-6.0)	3.1 (0.7-6.6)
Female sex	707 (39)	520 (37)	313 (36)	191 (38)	109 (34)
BMI, kg/m ²	25.6 (5.9)	25.2 (5.7)	25.8 (6.4)	25.6 (6.4)	26.0 (6.6)
Black race	87 (5)	60 (5)	33 (4)	17 (4)	16 (5)
Laboratory values					
Calcium (total), mg/dL	8.9 (0.8)	8.9 (0.8)	8.9 (0.8)	8.9 (0.8)	8.9 (0.8)
Phosphorus, mg/dL	5.0 (1.5)	5.2 (1.5)	5.1 (1.6)	5.4 (1.6)	5.2 (1.6)
PTH, pg/mL	233 (125-390)	215 (113-387)	227 (110-430)	240 (132-422)	219 (106-428)
Potassium, mg/dL	5.0 (0.8)	4.9 (0.8)	4.9 (0.8)	4.9 (0.7)	4.9 (0.8)
Hemoglobin, g/dL	11.0 (1.4)	11.0 (1.4)	10.9 (1.4)	10.8 (1.5)	10.8 (1.6)
Albumin, g/dL	3.8 (0.5)	3.7 (0.5)	3.7 (0.5)	3.7 (0.5)	3.6 (0.5)
Hemodialysis					
Catheter use	341 (19)	202 (15)	165 (20)	85 (17)	69 (22)
Dialysis dose, Kt/V	1.49 (0.33)	1.48 (0.31)	1.49 (0.31)	1.45 (0.32)	1.46 (0.31)
Comorbidities					
Coronary artery disease	511 (28)	391 (28)	259 (30)	149 (30)	114 (36)
Diabetes	697 (38)	550 (39)	361 (42)	205 (41)	162 (51)
Hypertension	1,531 (85)	1,195 (85)	712 (83)	423 (85)	274 (86)
Heart failure	317 (17)	225 (16)	144 (17)	103 (21)	75 (24)
Cancer	206 (11)	176 (12)	97 (11)	65 (13)	39 (12)
Liver cirrhosis	25 (1)	21 (1)	15 (2)	11 (2)	9 (3)
Lung disease	162 (9)	110 (8)	95 (11)	54 (11)	41 (13)

Note: The data are shown as mean (standard deviation), median (interquartile range), or n (%). Abbreviations: BMI, body mass index; HD, hemodialysis; PTH, parathyroid hormone.

Table 2. Patient Characteristics Based on Skindex-10 Score (0-60 Scale)

Characteristics	Categories of Skindex-10				
	0	1 to <20	20 to <35	35 to <50	≥50
Number of patients (%)	2,715 (55%)	791 (16%)	732 (15%)	475 (10%)	227 (5%)
Demographics					
Age	63.1 (14.6)	62.1 (14.6)	62.5 (14.5)	62.5 (14.5)	64.0 (15.0)
HD vintage, y	2.9 (0.8-6.7)	2.9 (1.0-6.8)	2.9 (0.8-6.9)	3.4 (1.0-6.6)	3.2 (0.9-6.7)
Female sex	1,032 (38)	299 (38)	264 (36)	175 (37)	70 (31)
BMI, kg/m ²	25.5 (5.9)	25.9 (6.1)	25.5 (6.2)	25.4 (6.8)	25.4 (5.5)
Black race	124 (5)	29 (4)	28 (4)	26 (6)	6 (3)
Laboratory values					
Calcium (total), mg/dL	8.9 (0.8)	8.9 (0.8)	8.9 (0.8)	8.8 (0.8)	8.9 (0.9)
Phosphorus, mg/dL	5.1 (1.5)	5.0 (1.5)	5.2 (1.6)	5.4 (1.6)	5.2 (1.7)
PTH, pg/mL	228 (120-390)	256 (136-461)	207 (111-393)	228 (120-424)	198 (94-362)
Potassium, mg/dL	5.0 (0.8)	4.9 (0.8)	4.9 (0.8)	4.9 (0.7)	5.0 (0.8)
Hemoglobin, g/dL	11.0 (1.4)	11.0 (1.5)	10.8 (1.4)	10.9 (1.4)	10.8 (1.4)
Albumin, g/dL	3.7 (0.5)	3.7 (0.5)	3.7 (0.5)	3.6 (0.5)	3.5 (0.5)
Hemodialysis					
Catheter use	480 (18)	136 (18)	118 (17)	80 (17)	48 (22)
Dialysis dose, Kt/V	1.48 (0.31)	1.51 (0.32)	1.46 (0.32)	1.47 (0.32)	1.45 (0.31)
Comorbidities					
Coronary artery disease	753 (28)	219 (28)	230 (32)	151 (32)	71 (32)
Diabetes	1,062 (39)	271 (34)	315 (44)	212 (45)	115 (52)
Hypertension	2,251 (84)	671 (86)	622 (86)	405 (86)	186 (82)
Heart failure	459 (17)	138 (17)	138 (19)	83 (18)	46 (21)
Cancer	328 (12)	100 (13)	84 (12)	48 (10)	23 (10)
Liver cirrhosis	33 (1)	13 (2)	22 (3)	5 (1)	8 (4)
Lung disease	232 (9)	84 (11)	68 (9)	49 (10)	29 (13)

Note: The data are shown as mean (standard deviation), median (interquartile range), or n (%). Abbreviations: BMI, body mass index; HD, hemodialysis; PTH, parathyroid hormone.

itch-related question and the Skindex-10 questionnaire (ie, score > 0), we examined the relationship between these 2 measures of CKD-associated pruritus. The association was positive and monotonic, as illustrated in Fig 4. The mean Skindex-10 score was 42.9 (standard deviation, 13.7) for the patients who indicated that they were extremely bothered by itchy skin, 34.1 (standard deviation, 13.0) for those very much bothered, 25.6 (standard deviation, 13.3)

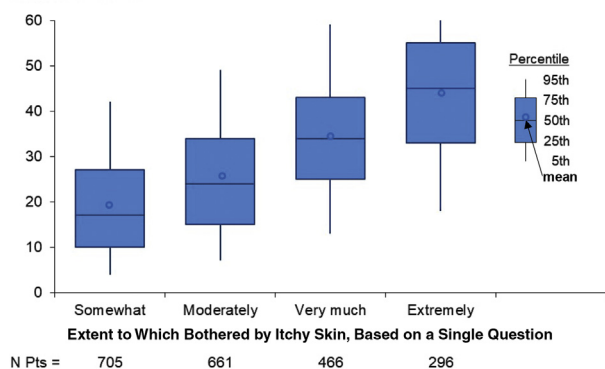


Figure 4. Distribution of Skindex-10 scores of >0 by categories of the single itch-related question for those who were bothered by itchy skin in the last 4 weeks (n = 2,128). Abbreviation: Pts, patients.

for those moderately bothered, and 19.3 (standard deviation, 12.0) for those somewhat bothered.

The Spearman correlation between the single itch-related question and the overall Skindex-10 score was strong, at 0.72. The correlation between the single itch-related question and each of the domains was 0.72 for the disease, 0.62 for the social, and 0.70 for the emotional domains. The correlations between the single itch-related question and each of the 10 individual Skindex-10 questions ranged from 0.47 to 0.74; the correlations with the single itch-related question were the strongest for the 4 Skindex-10 questions pertaining to being bothered by itching, the persistence or recurrence of itching, and being frustrated and annoyed by itching during the past week (Table S3).

Association of Itch With the Quality of Life

To investigate the relative strength of each measure of CKD-associated pruritus in predicting HR-QOL, we modeled the PCS and MCS scores using the Skindex-10 score, the single itch-related question, and both measures of CKD-associated pruritus. Both the measures of CKD-associated pruritus were strongly associated with HR-QOL when considered separately; the PCS and MCS scores were each approximately 9 points lower for patients extremely bothered by itchy skin than for those not at all

Table 3. Predicting Physical Component Summary and Mental Component Summary Scores Using Skindex-10 and/or a Single Itch-Related Question

Exposure	Outcome: PCS		Outcome: MCS	
	Effect Estimates (95% CI)	R ²	Effect Estimates (95% CI)	R ²
Extent to which bothered by itchy skin (single itch-related question)		0.065		0.056
Not at all	0 (Ref)		0 (Ref)	
Somewhat	-1.2 (-2.0 to -0.4)		-1.9 (-2.7 to -1.1)	
Moderately	-4.8 (-5.7 to -3.9)		-4.3 (-5.3 to -3.3)	
Very much	-5.9 (-7.1 to -4.8)		-6.3 (-7.5 to -5.1)	
Extremely	-8.9 (-10.3 to -7.5)		-8.8 (-10.2 to -7.3)	
Skindex-10 score		0.033		0.052
Per 10 points higher	-1.2 (-1.4 to -0.9)		-1.5 (-1.7 to -1.3)	
Both measures		0.065		0.063

Note: Unadjusted linear models were used for each chronic kidney disease-associated pruritus predictor; higher scores indicate better physical or mental health-related quality of life. Higher R² levels indicate better model prediction.

Abbreviations: CI, confidence interval; MCS, mental component summary; PCS, physical component summary; pts, points; Ref, reference.

bothered by itchy skin and 1-1.5 points lower for every 10-point increase in the Skindex-10 score (Table 3). The R² value for PCS was 0.065 when the single itch-related question was used and only 0.033 when Skindex-10 was used as the predictor. The R² value was slightly higher for MCS when the single itch-related question was used (0.056) versus when Skindex-10 was used (0.052). When both measures of CKD-associated pruritus were included, the predictive power for PCS did not improve compared with the power of the single itch-related question (R² = 0.065) and increased only slightly (R² = 0.063) for MCS. Similar results were obtained when other measures of HR-QOL were analyzed: the burden and effects of kidney disease (Table S4).

DISCUSSION

In our study, CKD-associated pruritus was highly prevalent among patients receiving HD: 63% when the single itch-related question, which asked about the extent to which the patients were bothered by itchy skin in the past 4 weeks, was used and 45% when Skindex-10, a 10-question instrument asking about itchy skin in the past week, was used. Both measures of CKD-associated pruritus were strongly associated with worse MCS and PCS quality-of-life scores. In fact, the single itch-related question was at least as predictive, if not more, of these key HR-QOL measures as Skindex-10, indicating that a simple, 1-question assessment of CKD-associated pruritus can be useful for the routine assessment of risks in patients receiving HD. With these 2 instruments being highly correlated and similarly predictive of HR-QOL, clinicians may favor the conciseness of the single itch-related question assessment in their everyday practice.

This simpler approach to the assessment of CKD-associated pruritus is likely to be beneficial to patients because it may allow for easier identification of pruritus in patients who may not proactively report symptoms to their physician without being prompted. Rayner et al¹¹ reported

that among patients almost always or always bothered by itching, pruritus had a major effect on work and social life, but 17% of patients did not report itching to their health care staff, and 18% used no treatment for pruritus. The detection of CKD-associated pruritus in the HD setting can be limited by patient factors such as resilience to symptoms, language ability, available time, and whether they expect health professionals to recognize itch as relevant from a clinical perspective. A prior DOPPS analysis demonstrated the prevalence of daily itching reported by patients to range from 42% to 84%.⁵ This study also showed that 60% of the patients reported itching for >1 year, and two-thirds of these patients were using medications, without relief. Surprisingly, 69% of medical directors substantially underestimated the prevalence of CKD-associated pruritus in their unit.⁵

The Skindex questionnaires have been widely used in research because of the organization of their questions into relevant domains in which CKD-associated pruritus may interfere. The single itch-related question correlates well with not only the total Skindex-10 scores ($r = 0.72$) but also the scores of its domains; the correlation was stronger for the disease ($r = 0.72$) and emotional domains ($r = 0.70$) than for the social domain ($r = 0.62$). We showed internal consistency in the Skindex-10 questionnaire. Regarding the prediction of PCS, the single itch-related question model outperformed Skindex-10 (R², 0.065 vs 0.033, respectively); the overall prediction power of the single itch-related question did not improve when additional information from Skindex-10 was included in the model (R² = 0.065). For MCS as well as the burden and effects of the models for the outcomes of kidney disease, the model with the single itch-related question used as the predictor had a slightly higher R² than the model in which the Skindex-10 score was used as the primary predictor.

The proportion of patients with at least some indication that they were bothered by itchy skin was 63% when assessed using the single question and 45% when assessed

using Skindex-10. This discrepancy may be, in part, due to the unequal range of recall time relevant to each instrument (4 weeks for the single itch-related question and 1 week for Skindex-10). Because the intensity of pruritus may fluctuate over time, due to factors such as anxiety and weather, it is possible that a patient who answered that they were not at all bothered by itchy skin in the last week could have had an episode of itch that was resolved in the previous weeks. Thus, the 4-week window of the single itch-related question provides an advantage and could be more sensitive toward the detection of cases of CKD-associated pruritus.

Most patient characteristics varied minimally across the categories of the Skindex-10 scores or the single itch-related question. The higher proportion of patients with diabetes among patients more severely bothered by CKD-associated pruritus may indicate an interaction between diabetes-associated neuropathy and CKD-associated pruritus. Coronary artery disease and heart failure were also somewhat more common among patients bothered by itchy skin. A cross-sectional study of patients with heart disease in Sweden reported a 40% prevalence of itching at some point during the last 3 months among patients with heart failure and 23% among patients with coronary artery disease; the study also pointed toward the use of medication for heart failure as a cause of itching, which may explain the differences between the prevalence among patients with heart failure and that among patients with coronary artery disease.¹⁷ Additionally, lower levels of albumin, a laboratory sign consistent with inflammation, which is used to determine the pathophysiology of CKD-associated pruritus, was associated with CKD-associated pruritus; this finding was also noted in previous studies.^{4,18,19} Consistent with other studies, we did not find an association between the markers of mineral bone disorders (eg, calcium, phosphorus, and parathyroid hormone) and CKD-associated pruritus.²⁰

This study adds to the growing understanding of the benefits of incorporating patient-reported outcomes into the clinical assessment of patients. Measuring patient-reported outcomes routinely by asking patients about the burden of symptoms associated with advanced kidney disease, such as pruritus, can cultivate shared decision making by improving communication between physicians and patients.²¹ This line of research also allows for more nuanced prediction of the trajectory of the disease and the assessment of risks and helps to facilitate self-monitoring in patients. Recent clinical trials of medications for pruritus have been conducted in patients receiving HD using more elaborate questionnaires, such as Skindex-10, to understand the effects of treatments on reducing the burden of CKD-associated pruritus.^{14,22-24} However, in clinical practice, we expect greater feasibility of incorporating a simpler approach, with the use of a single itch-related question, into the routine assessment of patients receiving HD. This approach, alongside routine measures of the quality of life, can allow for better identification, potentially leading to improved therapeutic strategies.

Research based on various patient focus groups and the Standardized Outcomes in Nephrology initiative has reported that CKD-associated pruritus is one of their highest priorities.^{25,26} Given the strong, negative effect of CKD-associated pruritus on patients' quality of life, its assessment should be routinely performed. The evaluation and treatment of CKD-associated pruritus—guided by a simple approach, with a single pruritus-related question—could also be an important goal when aiming to improve the quality of life of patients with CKD.

The relevant strengths of our study include the large sample size across the 17 countries, with the collection of data performed by trained professionals administering the questionnaires based on standardized protocols. Our study also has some limitations that are worth noting. A measurement bias by the instruments that may not have been filled out adequately is possible. The use of country-specific questionnaires that may have been translated into different languages could present a challenge because the context might have changed with the translation of the questionnaires, leading to possible score differences among the countries. This issue was noted in a study of coping instruments for patients receiving HD.²⁷

Supported by the results of this study, we propose a simple, routine, 1-question assessment of itch for patients receiving HD. The single itch-related question for itchy skin has qualities comparable with the more elaborate Skindex-10 questionnaire, is feasible and efficient for routine practice, and can reduce patient questionnaire burden. By asking a single itch-related question about the extent to which a patient was bothered by itchy skin in the last 4 weeks, we expect better communication between patients and physicians regarding this impactful symptom, which will be useful for triaging patients who might benefit from treatment and will potentially help to improve care for patients with CKD.

SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

Table S1: Skindex-10 Questions, as Listed in the Patient Questionnaire, Grouped in Their Respective Domains.

Table S2: Internal Consistency of the Skindex-10 Instrument, Shown by the Cronbach Alpha of the Correlation Between a Patient's Score for Each Skindex-10 Question With the Patient's Total Skindex-10 Score. Also Displayed Are the Correlations for the Question and the Skindex-10 Domain in Which it Belongs.

Table S3: Spearman Correlation Coefficient Between Skindex-10 Scores and the Single Itch-Related Question.

Table S4: Predicting Kidney Disease Burden and Kidney Disease Effects Component Summary Scores With the Skindex-10 and/or the Single Itch-Related Question.

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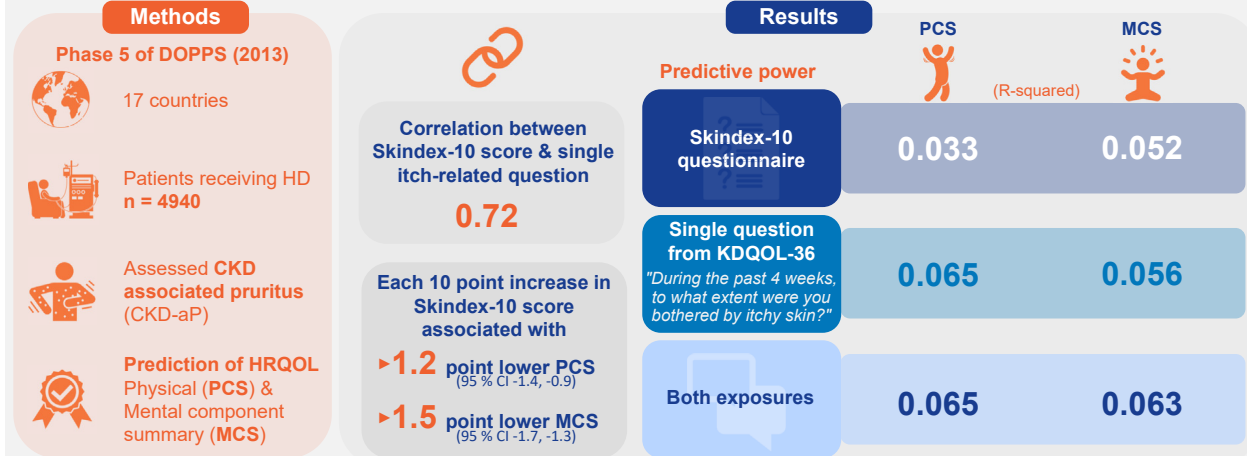
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What is the utility of a single itch-related question and the Skindex-10 questionnaire in assessing pruritus and predicting health-related quality of life (HRQOL) in hemodialysis patients?



Conclusion: The single question about the extent bothered by itchy skin highly correlated with the Skindex-10 score and was at least as predictive of key HRQOL measures as the longer questionnaire. In daily clinical practice, utilizing one simple question about the extent patients are bothered by itchy skin can be a feasible and efficient method for routine assessment of pruritus.

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