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INVESTIGATIVE REPORT

Affective and Sensory Dimensions of Pruritus Severity: Associations with Psychological Symptoms and Quality of Life in Psoriasis Patients

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The subjective dimensions of pruritus and their associations with psychological symptoms and quality of life were explored in a sample of 40 psoriasis patients. The patients completed a scale with descriptors from the Structured Itch Questionnaire together with measures of depression, distress, sleep quality and pruritus-related quality of life. Psoriasis severity was assessed with the Psoriasis Area and Severity Index. Factor analysis of descriptors confirmed both an affective and a sensory pruritus severity dimension. Multivariate statistics, controlling for age, gender, disease duration and severity, showed affective, but not sensory, pruritus severity to be a significant predictor of depressive symptoms, global distress, impairment of sleep, and pruritus-related quality of life. Mediation analyses indicated that impaired sleep quality partly mediated the association between pruritus severity and psychological symptoms. The results confirm that pruritus is multidimensional and indicate that the affective dimension may be the most important predictor of pruritus-related psychological morbidity, and that the association may be mediated by its negative impact on sleep quality. ***Key words: pruritus; depression; distress; sleep quality; quality of life.***

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Pruritus is a common symptom in many dermatological illnesses, including atopic dermatitis and psoriasis (1, 2), and is associated with a number of systemic diseases, e.g. chronic renal failure (3). Pruritus has multifactorial causes, including psychological and psychosomatic factors (4, 5). Itch has been observed to be induced by visual stimuli, such as viewing slides of mites, fleas and allergic reactions (6), and histamine release appears to be influenced by learning mechanisms (7). Experimental studies have demonstrated that the inflammatory response to a histamine prick test can be influenced by hypnotic suggestion (8), including hypnotically induced emotional states (9) and hypnotic analgesia (10). Pruritus can be a severely unpleasant symptom associated with considerable reduction in health-related quality of life (QoL) and impairment of sleep quality (1). Psychiatric co-morbidity in dermatology patients suffering from chronic pruritus is high, and psychosomatic factors and psychiatric co-morbidity may have an impact on the perception of pruritus, coping with pruritus and scratching behaviour (4, 11). However, most studies provide information only on the intensity of the sensation of itch, and data are lacking on the quality of the sensation (12).

The sensations of itch and pain have a lot in common (12), and recent data suggest that there is a broad overlap between pain- and itch-related peripheral mediators and receptors (13). There has long been a general consensus that experience of pain is multidimensional, and that assessment of pain needs to evaluate both the sensory qualities and unpleasant affective dimension (14). The McGill Pain Questionnaire (MPQ) (15) has been used for several decades to measure the different dimensions of pain. Based on the MPQ, Yosipovitch et al. (12) constructed a questionnaire measuring sensory and affective aspects of pruritus and validated this questionnaire in uraemic patients as well as in patients with atopic dermatitis (16). Our aim was to further validate this approach to assessment of pruritus in a sample of psoriasis patients and to explore the possible associations between the different dimensions of pruritus and the dependent variables of psychological symptoms and perceived impairment of pruritus-related QoL. As pruritus has been associated with impairment of sleep quality (1), and psychological symptoms such as depression have been linked to sleep disturbances (17), we also wished to investigate the role of sleep impairment as a possible mediator of the association between pruritus and psychological symptoms and QoL.

METHODS

Patients

Forty consecutively recruited psoriasis patients (24 men and 16 women) attending the outpatient dermatology clinic at the University Hospital of Copenhagen in Gentofte were invited to participate in a study of pruritus and its possible influence

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on different aspects of QoL. All of the patients agreed to participate and completed a questionnaire package. The study was conducted in accordance with the requirements of the local ethics committee.

Measures

- A *Pruritus Severity Questionnaire* listing the 6 sensory descriptors ("crawling like ants", "tickling", "pinching", "stabbing", "stinging" and "burning") and 4 affective descriptors ("unbearable", "worrisome", bothersome" and "annoying") as described by Yosipovitch et al. (12). Each descriptor was ranked on a 4-point Likert scale from 0 = none to 3 = severe. Two independent translations into Danish of the English descriptors were discussed and a preliminary version was agreed upon. This version was back-translated, and a final version was prepared taking any discrepancies between the 2 versions into consideration.
- Severity of pruritus was also assessed on a 100-mm visual analogue scale (VAS) with end-points anchored by "no itch" and "as bad as could possibly be". As a comparison measure, the patients were also asked to rate on a VAS the severity of the strongest itch after a mosquito bite.
- A short *Sleep Quality Questionnaire* consisting of 3 modified items from the Pittsburg Sleep Quality Index (18). The patients were asked to rate on a 4-point scale: (*i*) how much their pruritus had made it difficult to sleep during the past week; (*ii*) how well they had generally slept during the past week (reversely scored); and (*iii*) whether they had used any sleep medication during the past week. A total Impairment of Sleep score (0–9) was calculated by adding the scores of the 3 items with higher scores indicating greater impairment of sleep. The patients were also asked to estimate the average number of hours they had slept per night during the past week.
- The short 13-item version of *Beck Depression Inventory* (BDI-13) (19). The short version has been shown to be a reliable and valid screening instrument for depression (20). Tested in a sample of 3486 Danish women treated for breast cancer (21), the BDI-13 has shown good internal consistency (Cronbach's alpha: 0.83) and validity. Scores for each item range from 0 to 3, yielding a total depression score ranging from 0 to 39. Receiver operating characteristic (ROC) analysis using the same sample showed that a cut-off of 9 yielded both high sensitivity (98.6%) and specificity (94.6%) for identifying participants characterized as having moderate-severe depression on the full 21-item BDI.
- The 18-item *Brief Symptom Inventory* (BSI-18) (22) was used for assessing general distress. Scores on each item ranges from 0 to 4, and a Global Severity Index is calculated with scores ranging from 0 to 72. The suggested cut-off scores for distress caseness of 10 for men and 13 for women (22) were used to identify patients with high vs. low distress.
- To measure QoL impairment directly related to the impact of pruritus, we modified the *Dermatology Life Quality Index* (DLQI) (23, 24). Item 1 referring directly to pain or itch severity was excluded, as this otherwise would artificially increase the association with the pruritus severity measure investigated. Item 2, which refers to embarrassment due to appearance, was excluded together with item 10, which refers to problems related to the treatment of the skin condition, as these items are unrelated to pruritus. The remaining items were rephrased to refer directly to difficulties due to pruritus. Reliability was tested in the present sample.
- Questions concerning age, disease duration, co-morbidity and medication.
- Finally, psoriasis severity was assessed by a dermatologist using the *Psoriasis Area and Severity Index* (PASI) (25).

Statistical analysis

The dimensional structure of the pruritus descriptors was analysed with an exploratory principal components analysis with varimax rotation. Variables were plotted, inspected and tested for normality. BDI-13 and BSI-18 scores were skewed and deviated significantly from normality (Kolmogorov-Smirnov test). The variables were successfully transformed using the square root (BDI-13) and log-10 (BSI-18). The data for men and women were compared with χ^2 tests and *t*-tests for independent samples, correcting for multiple comparisons with the Bonferroni method (26). Correlations between variables were calculated, and the influence of the 2 different dimensions of pruritus on depressive symptoms, general distress and QoL was analysed with multiple, hierarchical linear regression analyses controlling for age, sex, disease duration, disease severity and sleep quality. In addition, logistic regression was used to test the associations between pruritus and the risk of being classified as having moderate-severe depression as well as general distress caseness. Finally, the possible mediating effects of sleep quality on these associations were explored. Baron & Kenny (27) and Kenny et al. (29) have defined 4 analytical steps necessary to establish mediation: (*i*) the independent variable (IV) should be a significant predictor of the dependent variable (DV), (*ii*) the IV should predict the mediator, (*iii*) the mediator should predict the DV, when controlling for the IV, and (*iv*) the association between the IV and the DV should be reduced, when controlling for the mediator. Complete mediation of the IV–DV association requires that the IV–DV association is reduced to zero when controlling for the mediator. Partial mediation requires the association to be reduced to a non-trivial size but not to zero. In addition, for each of the 3 DVs, the Sobel test was used as a direct test of mediation (28).

RESULTS

Cronbach's alpha of the BDI-13, BSI-18 and the modified DLQI were 0.90, 0.92 and 0.85, respectively, indicating good internal consistency in the present sample. The demographic characteristics of the patient sample, including sex, age, disease severity (PASI) and disease duration are shown in Table I. The scores on the 10 pruritus severity descriptors were analysed with an exploratory principal components analysis with varimax rotation. The rotation converged in 3 iterations and confirmed 2 distinct, independent factors. Factor 1, termed the affective dimension, consisted of the 4 original affective descriptors, described by Yosipovitch et al. (12), i.e. "unbearable", "worrisome", bothersome" and "annoying", together with 2 of the original sensory descriptors: "burning" and "stinging". Factor 2, the sensory dimension, consisted of the 4 sensory descriptors of "crawling like ants", "tickling", "pinching" and "stabbing". When analysing the non-parametric correlations between the scores of each descriptor with total BDI-13 and BSI-18 scores, the original sensory descriptors of "burning" and "stinging" were significantly associated with both depressive symptoms (rho 0.46–0.47; $p < 0.01$) and distress (rho 0.53–0.55; $p < 0.01$), while the remaining sensory descriptors were not (rho 0.10–0.30, ns).

Table I. *Sample characteristics given as mean with standard deviation (SD) within parentheses, were not otherwise stated*

	Men ($n=24$)	Women ($n=16$)	p[b]	Total
Age (years)	50.7 (13.1)	58,5 (12,5)	0.07	53.8 (13.3)
Psoriasis Area and Severity Index (PASI) score	13.6 (7.7)	11.9 (9.0)	0.54	12.9 (8.2)
Disease duration (years)	21.6 (12.1)	29.8 (15.9)	0.24	24.8 (14.1)
Co-morbidity (%)	55.0	45.0	0.52	50.0
Pruritus severity (VAS)	74.5 (25.4)	85.1 (19.6)	0.17	78.8 (23.6)
Perceived severity of mosquito bite (VAS)	50.4 (34.0)	44.3 (34.1)	0.58	48.0 (33.8)
Sensory Pruritus Severity (SPS)	39.9 (24.1)	33.3 (25.1)	0.41	37.3 (24.4)
Affective Pruritus Severity (APS)	58.3 (29.3)	67.4 (30.1)	0.35	61.9 (29.6)
Average hours of sleep	5.8 (1.5)	6.3 (1.6)	0.30	6.0 (1.5)
Total Sleep Quality	3.5 (2.6)	4.4 (1.9)	0.28	3.9 (2.4)
Depressive symptoms (BDI-13)	8.2 (7.5)	8.9 (6.1)	0.73	8.5 (6.9)
Moderate-severe depression (BDI-13 ≥ 9) (%)	29.2	31.3	0.89	30.0
Distress: Global Severity Index (BSI-18)	11.4 (13.0)	15.8 (14.9)	0.32	13.2 (13.8)
Distress caseness (BSI-18 ≥ 10 (men) ≥ 13 (women)) (%)	37.5	50.0	0.43	42.5
Pruritus-related quality of life (DLQI)[a]	8.7 (5.9)	8.9 (6.3)	0.89	8.8 (6.0)

[a]Modified DLQI omitting irrelevant items and item relating directly to perceived itch and phrasing items to relate to impairment of QoL due to itch.
[b]p-values presented are uncorrected for multiple comparisons.
VAS: visual analogue scale; BDI-13: short 13-item version of Beck Depression Inventory; BSI-18: 18-item Brief Symptom Inventory; DLQI: Dermatology Life Quality Index.

Scores on the 6 affective and the 4 sensory items were summed to an Affective Pruritus Severity (APS) and a Sensory Pruritus Severity (SPS) score. Sum scores were calculated as percentage scores. Mean affective (APS) and sensory (SPS) scores are shown in Table I, together with mean scores on the pruritus VAS, the BDI-13, the BSI-18, the modified DLQI, average hours of sleep per week and total Sleep Quality scores. Although women showed a tendency to be older, have longer disease duration, be more depressed and distressed, to score higher on APS, and to have more sleep impairment than men, no differences reached statistical significance with or without correcting for multiple comparisons. Mean VAS pruritus intensity was 65% higher than mean perceived intensity of itch associated with a mosquito bite ($p<0.001$).

Correlations between perceived pruritus measures, age, disease severity, disease duration, sleep quality and measures of depression and distress are shown in Table II. VAS pruritus severity showed significant positive correlations with several measures, including sleep impairment, depressive symptoms, distress and QoL impairment, regardless of whether or not perceived pruritus severity of a mosquito bite was controlled for. One exception was that pruritus severity of a mosquito bite was significantly inversely correlated with PASI

Table II. *Correlations between pruritus severity, demographic and disease characteristics, sleep quality, depression and distress*

R	Sensory Pruritus Severity (SPS)	Affective Pruritus Severity (APS)	Pruritus severity 1 (VAS)	Perceived severity of mosquito bite (VAS)	Pruritus severity 2 (VAS)[a]
Pruritus severity (VAS)	0.30	0.65**	–	–	–
Perceived severity of mosquito bite (VAS)	0.08	0.34*	0.23	–	–
Sensory Pruritus Severity	–	0.41**	0.30	0.08	0.29
Affective Pruritus Severity	0.41**	–	0.65**	0.09	0.65**
Age	–0.11	0.09	0.30	0.02	0.30
Disease severity (PASI)	0.15	0.20	0.21	–0.36*	0.33**
Disease duration (years)	–0.07	0.01	0.03	–0.14	0.07
Average hours of sleep	–0.22	–0.29	–0.26	–0.16	–0.23
Total Impairment of Sleep	0.16	0.59**	0.64**	0.21	0.62**
Depressive symptoms (BDI-13)	0.34*	0.49**	0.48**	0.14	0.41**
Distress: Global Severity Index (BSI-18)	0.39*	0.49**	0.39*	–0.08	0.47**
Pruritus-related Quality-of-Life (DLQI)[b]	0.15	0.52**	0.58**	0.02	0.60**

[a]Partial correlation, controlling for perceived severity of mosquito bite.
[b]Modified DLQI omitting irrelevant items and item relating directly to perceived itch and phrasing items to relate to impairment of quality of life due to itch.
*$p<0.05$; **$p<0.01$.
VAS: visual analogue scale; PASI: Psoriasis Area and Severity Index; BDI-13: short 13-item version of Beck Depression Inventory; BSI-18: 18-item Brief Symptom Inventory; DLQI: Dermatology Life Quality Index. R: correlation coefficient.

scores, and when controlling for this variable, VAS pruritus severity was significantly positively correlated with PASI scores. APS scores showed several moderate to large correlations, while SPS showed fewer and more moderate correlations. When analysing the independent contribution of APS and SPS to VAS pruritus severity with multiple linear regression, only APS was a significant predictor (beta: 0.64; $p < 0.001$), while SPS was not (beta: 0.04; $p = 0.79$).

Multiple hierarchical linear regression analyses were conducted with depressive symptoms, global severity of distress scores and impairment of QoL as independent variables, and age, sex, disease duration, disease severity, APS, SPS and sleep impairment as independent variables, with sleep impairment entered at the second and last step. The results are shown in Table III. At the first step, only APS was significantly associated with depressive symptoms, and ceased to be significant when sleep impairment was entered at the second step. Age and APS were significant predictors of global severity of distress at the first step, and only age after entering sleep impairment into the equation. For QoL impairment, APS continued to be a significant predictor after adding sleep impairment to the model. Neither disease severity nor SPS were significantly associated with the independent variables. Similar results were found when analysing the associations with depression and distress caseness as categorical variables with multiple hierarchical logistic regression analyses, with APS being the only significant predictor of moderate-severe depression and distress caseness (data not shown).

When entering sleep impairment into the equations, the associations between APS and depression and distress ceased to be significant, suggesting that sleep impairment could be a mediator of the negative influence of APS on depression and distress. A further analysis of mediation was therefore conducted for impaired sleep quality as a mediator of the association between APS and the dependent variables of depressive symptoms, global severity of distress scores and impairment of QoL. As seen in Table IV, when applying the criteria for mediation, both tests revealed impairment of sleep quality to be a partial mediator of the association between APS and global severity of distress. Although the direct test only yielded a near-significant ($p = 0.07$) result, the results indicated that impairment of sleep quality was also a partial mediator of the association between APS and depressive symptoms. In contrast, the results for the association between APS and impairment of QoL did not show impairment of sleep quality to be a mediator of this association.

Table III. *Results of multiple, hierarchical linear regressions with depressive symptoms, global severity of distress and impairment of quality of life (QoL) as dependent variables, and demographics, disease characteristics and severity of pruritus as independent variables*

Dependent variable		Beta	*p*	R^2
Depressive symptoms (BDI-13) predictors				
Step 1	Age	0.24	ns	
	Sex	0.08	ns	
	Disease duration	0.16	ns	
	Disease severity (PASI)	–0.11	ns	
	Sensory Pruritus Severity	0.12	ns	
	Affective pruritus Severity	0.46	0.01	0.32
Step 2	Age	–0.21	ns	
	Sex	0.07	ns	
	Disease duration	0.13	ns	
	Disease severity (PASI)	–0.11	ns	
	Sensory pruritus severity	0.15	ns	
	Affective pruritus severity	0.29	ns	
	Total sleep quality	0.28	ns	0.37
Distress (BSI-18) predictors				
Step 1	Age	–0.33	0.05	
	Sex	0.18	ns	
	Disease duration	0.11	ns	
	Disease severity (PASI)	–0.13	ns	
	Sensory pruritus severity	0.16	ns	
	Affective pruritus severity	0.52	0.001	0.37
Step 2	Age	–0.30	0.05	
	Sex	0.16	ns	
	Disease duration	0.08	ns	
	Disease severity (PASI)	–0.13	ns	
	Sensory pruritus severity	0.18	ns	
	Affective pruritus severity	0.34	ns	
	Total sleep quality	0.29	ns	0.41
Pruritus-related QoL (DLQI)				
Step 1	Age	–0.28	0.05	
	Sex	0.00	ns	
	Disease duration	0.07	ns	
	Disease severity (PASI)	0.08	ns	
	Sensory pruritus severity	0.04	ns	
	Affective pruritus severity	0.64	0.001	0.41
Step 2	Age	–0.26	ns	
	Sex	–0.01	ns	
	Disease duration	0.04	ns	
	Disease severity (PASI)	0.07	ns	
	Sensory pruritus severity	0.07	ns	
	Affective pruritus severity	0.50	0.01	
	Total sleep quality	0.24	ns	0.44

PASI: Psoriasis Area and Severity Index; BDI-13: short 13-item version of Beck Depression Inventory; BSI-18: 18-item Brief Symptom Inventory; DLQI: Dermatology Life Quality Index; ns: not significant.

DISCUSSION

Itch is a complex subjective phenomenon, a factor generally not addressed in previous studies of pruritus focusing only on the intensity of itch, e.g. with single items or using single VAS. Our results confirm that the patients' perception of pruritus and its severity, like the phenomenon of pain, is multidimensional. When analysing the 10 pruritus descriptors proposed by Yosipovitch et al. (12) with an exploratory factor analysis, our results confirmed 2 distinct dimensions. One dimension consisted of 4 of the 6 descriptors representing the sensory dimension of pruritus, namely "crawling like ants", "tickling", "pinching" and "stabbing". The second dimension included all 4 descriptors labelled as affective, i.e. "unbearable",

Table IV. *Results of analyses of impairment of sleep quality as a mediator of the association between affective pruritus severity and the dependent variables of depressive symptoms, global severity of distress and impairment of quality of life (QoL)*

Step	Coefficient	*p*
Testing for mediation of the association between affective pruritus severity and depressive symptoms (BDI-13)		
A: IV predicts DV	0.63	0.001
B: IV predicts mediator	0.26	0.0001
C: Mediator predicts DV, controlling for the IV	0.98	0.05
D: IV-DV association reduced, controlling for the mediator	0.37	0.09
Sobel direct test of mediation: effect: 0.26; $p=0.07$		
Testing for mediation of the association between affective pruritus severity and global severity of distress (BSI-18)		
A: IV predicts DV	1.26	0.001
B: IV predicts mediator	0.26	0.0001
C: Mediator predicts DV, controlling for the IV	2.24	0.03
D: IV-DV association reduced, controlling for the mediator	0.67	0.13
Sobel direct test of mediation: effect: 0.59; $p=0.04$		
Testing for mediation of the association between affective pruritus severity and impairment of QoL (DLQI-modified)		
A: IV predicts DV	0.73	0.0001
B: IV predicts mediator	0.26	0.0001
C: Mediator predicts DV, controlling for the IV	0.61	0.12
D: IV-DV association reduced, controlling for the mediator	0.57	0.002
Sobel direct test of mediation: effect: 0.16; $p=0.14$.		

IV: independent variable; DV: dependent variable; BDI-13: short 13-item version of Beck Depression Inventory; BSI-18: 18-item Brief Symptom Inventory; DLQI: Dermatology Life Quality Index.

"worrisome", bothersome" and "annoying". Two of the original sensory descriptors, "burning" and "stinging", however, loaded on a separate dimension together with the 4 affective descriptors. In addition, these 2 descriptors were significantly associated with depressive symptoms and global distress, while the remaining sensory descriptors were not. Taken together, this could suggest that "burning" and "stinging", or at least in their Danish translations ("*brændende*" and "*sviende*"), are not perceived by patients as purely sensory, but have an affective connotation. The results indicate that further analyses are needed in larger patient samples with different linguistic and cultural backgrounds if we are to identify valid descriptors of the sensory and affective dimensions of pruritus.

Another aim of the study was to investigate the possible associations between the different dimensions of pruritus and psychological symptoms. A large proportion of the patients in this sample showed significant depressive symptoms (30%) and global distress (42.5%), supporting previous findings of psychological co-morbidity in patients with pruritus (4) and in psoriasis and other dermatological patients in general (30). When exploring the univariate correlations between the severity of affective and sensory pruritus and impairment of sleep, depressive symptoms, global distress and impairment of QoL, affective pruritus severity showed larger and more consistent correlations than sensory pruritus severity, suggesting that the affective dimension is more important than the sensory, even though the 2 dimensions correlated moderately with each other. This was confirmed in the multivariate analyses, verifying affective, and not sensory, pruritus severity as the main predictor of psychological symptomatology. It should be noted that neither intensity of pruritus, as measured on a VAS, nor the affective or sensory severity dimensions of pruritus were found to be associated with dermatology-rated disease severity, as assessed by the PASI. This finding is consistent with results reported by Yosipovitch et al. (1). In addition, no associations were found between PASI scores and all 3 dependent variables of depressive symptoms, global distress and impairment of QoL. This is in concordance with previous results from a study of Nordic psoriasis patients, showing that while self-reported disease severity was a significant predictor, PASI scores were unrelated to impairment of psoriasis-related QoL (31). The results underscore the necessity to assess patients' perceptions of different aspects of their disease. For comparison, a measure of the perceived severity of a mosquito bite was included, and mean intensity of pruritus, as measured on the VAS, was significantly greater than the mean scores on this comparison measure. The comparison measure did not correlate with affective or sensory pruritus severity, and the only statistically significant correlation found for perceived severity of a mosquito bite was an inverse correlation with PASI scores. We have no clear explanation for this result. One possible explanation could be that psoriasis may reduce the sensitivity to other sensory stimuli. This explanation is supported by recent results showing reduced sensitivity to histamine prick tests in both lesional and non-lesional skin of psoriasis patients compared with higher sensitivity in lesional skin of atopic dermatitis patients (32). Another explanation could be that more severe disease could influence the interpretation of minor annoyances, such as a mosquito bites, making them relatively less important to the patient.

Psoriasis patients report that their itch becomes worse at night but is ameliorated by sleep (1), and a large

proportion of atopic dermatitis patients with pruritus report difficulties falling asleep (16). Depressed patients often report sleep problems, including difficulties falling and staying asleep as well as poor subjective sleep quality; findings that have been confirmed by objective assessments through polysomnography (17, 33). We therefore wished to investigate whether the association between pruritus severity and psychological symptoms and impairment of quality of life was mediated by impairment of sleep quality. Using the statistical approach to test mediation suggested by Baron & Kenny (27) and Kenny et al. (29), our results suggested that impaired sleep quality partly mediated the association between affective pruritus severity and depressive symptoms and global distress. Our findings differ from those of an earlier study, where pruritus severity did not differ between psoriasis patients with and without nocturnal wakening (34). The different results could stem from the differences in pruritus and sleep quality measurements used in the 2 studies, and further studies are needed to explore the associations between pruritus, sleep quality and psychological symptoms. We did not find sleep quality to mediate the association with QoL, where the association with pruritus severity continued to be statistically significant when controlling for sleep quality. The QoL measure assessed the negative influence of pruritus on social relations, work and other daily activities. This could explain the result, as these factors are less likely to be influenced by sleep difficulties than psychological symptoms. Although the modified DLQI showed good internal consistency, and the correlations with pruritus severity could be interpreted as an indicator of its validity as a measure of pruritus-related QoL-impairment, the reliability and validity of the measure clearly needs to be explored further. The relatively modest sample size ($n = 40$) should also be taken into consideration. Taken together, alleviating sleep problems may thus be a potentially beneficial avenue to take when attempting to reduce the negative impact on psychological well-being of patients with pruritus.

Our results confirm previous findings of psychological co-morbidity in patients with pruritus. Taken together, our results also indicated that pruritus, in particular the affective dimension, was a significant contributor to these symptoms, an association that was, at least partly, mediated by impaired sleep quality. The results highlight the necessity to assess patients' perceptions of different aspects of their disease and to continue the development of reliable valid measures of these aspects.

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