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INVESTIGATIVE REPORT

Pruritus in Psoriasis: A Study of Personality Traits, Depression and Anxiety

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Pruritus intensity is often not proportional to disease severity in patients with psoriasis or other pruritic dermatoses. Increasing evidence indicates that psychological factors may play an important role in the overall aetiology of pruritus. The aim of this study was to examine whether patients with psoriasis and severe pruritus differ psychologically from those with mild pruritus. In this study of 101 patients with plaque psoriasis, those with severe pruritus reported significantly higher scores for both depression and anxiety. Using the Swedish universities Scales of Personality, 4 personality traits were significantly associated with severe pruritus: Somatic trait anxiety, Embitterment, Mistrust, and Physical trait aggression. These results indicate that patients with psoriasis and severe pruritus might have a more vulnerable psychological constitution. This suggests important opportunities for clinicians to identify patients who could benefit from psychological interventions. ***Key words: plaque psoriasis; itch; psychodermatology; psychology; psychosomatics; psychosocial factors.***

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Pruritus is one of the most common, but often unrecognized, symptoms of psoriasis, with a reported prevalence of 60–90% (1–8). For many patients, pruritus is the most bothersome symptom of their disease (3, 4). Quality of life may be greatly affected, both with respect to the discomfort, and the sense of embarrassment and stigmatization that are solely due to pruritus (6, 9–15). Therapeutic options to alleviate pruritus in psoriasis are limited (16, 17).

The intensity of pruritus reported by patients with psoriasis or other pruritic dermatoses is often not proportional to the actual disease severity (3, 6, 10, 18). Psychosocial and psychosomatic factors have been noted to play an important role in the overall aetiology of pruritus (3, 9, 19, 20), although the mechanisms involved are not fully understood. The skin and the brain are intimately connected through the autonomic nervous system, and pruritus is a symptom that demonstrates this complex link through a neuro-immuno-cutaneous relationship (21–26).

Psychiatric illness, e.g. depression and anxiety, has been associated with pruritus, both in psoriasis and other inflammatory dermatoses, and may have an impact on both perception of and coping with pruritus (4, 6, 10, 11, 27, 28). In 2 different studies, Gupta et al. (4, 27) noticed a direct positive relationship between the severity of pruritus and the severity of depression in patients with psoriasis. Severe pruritus may contribute to a negative affective state, but recent studies indicate that depression may increase pruritus perception and act as a predictor of itch (29, 30). Results from a pioneering experimental study showed that negative emotions can lead to higher levels of both itch and pain (29). Thus, both depression and certain personality characteristics have been identified as predictors of experimentally induced pruritus in patients with atopic dermatitis (30). Some personality characteristics have been associated with pruritus, e.g. hostility, aggressivity, emotional lability, and self-consciousness (30–32). However, to our knowledge no study has yet examined the relationship between personality traits and pruritus in psoriasis as assessed by a more extensive structured personality inventory.

The aim of this study was to further examine the relationship between pruritus and psychological variables in psoriasis. With increasing evidence, psychological interventions may become an important approach to alleviate this bothersome symptom.

We hypothesize that patients with high intensity of pruritus are more psychologically vulnerable with regard to personality traits, anxiety and depression than patients with lower pruritus intensity.

MATERIALS AND METHODS

Subjects

All subjects were recruited consecutively from planned visits to the out-patient clinic of the Department of Dermatology and Venereology at Skåne University Hospital in Malmö, Sweden. Inclusion criteria were: plaque psoriasis diagnosed by a dermatologist, men and women aged 18–65 years, good command of the Swedish language, and no serious mental or cognitive disturbances. A total of 109 patients were invited to join the study during early autumn 2008 (53%) and autumn 2009 (47%).

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Of these, 102 agreed to participate (94%) and provided oral and written informed consent. One patient dropped out of the study because he considered the questions to be too personal. All of the 101 (93%) remaining participants were unpaid volunteers.

Methods

A psychosocial semi-structured 25-item interview was conducted in a quiet room at the out-patient clinic (Appendix S1[1]). All subjects were interviewed by the same researcher (CR). The interview was designed by 2 of the authors (KS and CR), with the purpose of assessing: (*i*) socio-demographic variables, (*ii*) social situation, close relationships, and (*iii*) psoriasis-related distress. Answers were rated on a 5-point Likert scale. Regarding (*ii*) social situation and close relationships, patients were asked about satisfaction with living conditions, working conditions, personal finances and satisfaction with relationships with mother, father, partner, children, friends and colleagues. Regarding social situation, answers were dichotomized as "satisfied" (1–3) and "not satisfied" (4–5). Regarding close relationships, answers were dichotomized as "good" (1–3) and "deficient" (4–5). Patients who did not have any relationship with the mother or father were included in the groups "deficient" relationships, respectively. Regarding (*iii*) psoriasis-related distress, patients were asked about the impact of their psoriasis on daily life and on sexual relations. Answers were dichotomized as "low impact" (1–3) and "high impact" (4–5).

Pruritus

At the end of the interview, all patients were asked to rate their pruritus in general on a visual analogue scale (VAS) consisting of a 10-cm straight line without numbers or sections. The left-hand end was labelled "no pruritus" and the right-hand end was labelled "severe pruritus". The scale was read in cm to 1 decimal place. According to recent recommendations (33), the severity of pruritus was categorized into 5 groups: no pruritus (VAS = 0), mild pruritus (VAS > 0 <4), moderate pruritus (VAS ≥ 4 <7), severe pruritus (VAS ≥ 7 <9) and very severe pruritus (VAS ≥ 9). For the purpose of χ^2 and analysis of variance (ANOVA) analyses, these categories were merged into 3 groups: (*i*) low-level pruritus = VAS 0 < 4, (*ii*) medium-level pruritus=VAS ≥ 4 <7, and (*iii*) high-level pruritus=VAS ≥ 7. In logistic regression analysis pruritus was dichotomized as 0 = low-level + medium-level and 1 = high-level pruritus. Patients were asked to rate the level of pruritus they generally experience to avoid any stressful influence by the interview, since stress may increase the intensity of pruritus (5, 23, 34). Our aim was to detect the level of pruritus generally experienced to relate to the patients' psychological constitution.

After the interview, each patient was given privacy to complete 3 validated psychometric self-rating scales. The Spielberger State-Trait Anxiety Inventory (STAI Form-Y) (35) and the Beck Depression Inventory (BDI-II) (36) were used to assess symptoms of anxiety and depression, respectively. Regarding BDI-II, total scores, as well as scores of cognitive-affective and somatic subscales were used in analysis (37, 38). Further descriptions of STAI and BDI-II are given in Appendix S2[1]. Question number 16 of the BDI-II evaluates sleep disturbances. Since sleep disturbances may be associated both with depression and pruritus (39), this variable was extracted, dichotomized and used in the logistic regression analysis.

The third scale, Swedish Universities Scales of Personality (SSP) has been developed to identify 13 stable traits of psychological vulnerability and psychopathology (40). The traits are: 1) somatic trait anxiety, 2) psychic trait anxiety, 3) stress susceptibility, 4) lack of assertiveness, 5) impulsiveness, 6) adventure seeking, 7) detachment, 8) social desirability, 9) embitterment, 10) trait irritability, 11) mistrust, 12) verbal trait aggression, and 13) physical trait aggression (41). Values of 10 points above or below 50 in each SSP scale indicate a difference from the standard population by 1.0 SD (41). Further description of the SSP is given in Appendix S2[1].

Psoriasis Area and Severity Index (PASI)

Clinical assessment of PASI (42) was conducted on the 48 patients recruited during autumn 2009, and categorized as: PASI ≤ 10 = mild plaque psoriasis, PASI >10 = moderate to severe plaque psoriasis (43). Further description of PASI is available in Appendix S2[1].

Statistical analysis

Scatter plots and correlation analyses were used to examine relationships between pruritus intensity and the psychometric variables. Independent samples *t*-tests were used for group comparisons when appropriate. χ^2 tests and one-way ANOVA analyses were used for group comparisons between the 3 levels of pruritus and socio-demographic variables, psychosocial variables, psoriasis-related distress, PASI, and scores on the psychometric scales. *Post hoc* multiple comparisons were performed, using Tukey's test to identify pairwise significant differences. A logistic regression model was designed with high-level pruritus as the dependent variable. Independent variables used in the final model were: gender, age, BDI-II scores ≥ 20, sleep disturbances, psoriasis impact on daily life and psoriasis impact on sexual relations. Other psychosocial variables were not included in the model, since the vast majority were satisfied with social conditions and relations. Higher scores of STAI (>40) and SSP-traits (>60) were included one by one, but none of them were significantly related to high-level pruritus, and therefore excluded. Two-tailed *p*-values < 0.05 were considered to be statistically significant. Statistical analyses were carried out using the Statistical Package for the Social Sciences, version 21.0 (SPSS™, Chicago, IL, USA).

The ethics committee of the Medical Faculty, University of Lund approved the study.

RESULTS

Pruritus was reported by 98 patients (97%), of whom 30% had high-level pruritus. The distribution of pruritus scores are shown in Table I together with age and gender. Additional clinical and socio-demographic characteristics are shown in Table SI[1]. No significant differences were found between levels of pruritus regarding all socio-demographic and clinical variables in the study.

There were no significant differences between men and women regarding pruritus, age, duration of disease and scores of the psychometric and PASI scales. The results are thus presented without respect to gender.

One-way ANOVA analyses and multiple comparison tests showed statistically significant differences between high-level pruritus (VAS ≥ 7) and low-level pruritus (VAS < 4), regarding mean scores of STAI, state- and trait anxiety, BDI-II (total- and cognitive-affective

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Table I. *Clinical and socio-demographic characteristics (*n = *101)*

Characteristics	
Pruritus VAS, mean ± SD, median (range)	4.6 ± 3.2, 4.7 (0–10)
Level of pruritus *n* (%)	
No pruritus (VAS 0)	3 (3)
Mild pruritus (VAS > 0 <4)	44 (44)
Moderate pruritus (VAS ≥4< 7)	24 (24)
Severe pruritus (VAS ≥7< 9)	16 (16)
Very severe pruritus (VAS ≥9)	14 (14)
Gender, *n* (%)	
Male	56 (55)
Female	45 (45)
Age, years, mean ± SD, median (range)	43.5 ± 13.8, 45 (18–65)

VAS: visual analogue scale; SD: standard deviation.

scores), and 4 SSP-personality traits, i.e. Somatic trait anxiety, Embitterment, Mistrust and Physical trait aggression. Mean scores of the psychometric scales and group comparisons are presented in Table II.

Twenty-one patients (21%) showed BDI-II scores ≥ 14, 12 patients (12%) showed BDI-II scores ≥20 and 2 (2%) BDI-II scores ≥ 29. BDI-II scores were positively correlated with state and trait anxiety scores (rho = 0.71 and rho = 0.71, respectively, $p < 0.001$), and also with SSP-Embitterment and Mistrust (rho = 0.50 and rho = 0.56, respectively, $p < 0.001$).

Thirty-seven patients (37%) reported sleep disturbances in question 16 of the BDI-II.

In the multivariate logistic regression analysis, BDI-II depression scores ≥ 20, sleep disturbances and psoriasis influence on sexual relations, were significantly associated with high-level pruritus. Odds ratios (95% confidence interval (95% CI)) and *p*-values are presented in Table III.

Psychosocial interview

Most patients (89–98%) were satisfied with their social conditions, and close relationships (79–100%). No significant differences were found between levels of pruritus regarding dichotomized groups of the psychosocial variables, except regarding relationship with the father. Patients with a deficient (or no) relationship with the father ($n = 21$) statistically significantly more often reported high-level pruritus (48%), compared with patients with a good relationship with the father (25%), $p = 0.04$. Patients with a deficient (or no) relationship with the father were not more depressed than patients with a good relationship with the father.

Among the patients who reported high psoriasis impact on their daily life, 23 out of 49 (47%) reported high-level pruritus. In the group that reported low psoriasis impact on daily life, 7 out of 52 (13%) reported high-level pruritus ($p < 0.0001$). Among the patients who reported high psoriasis impact on sexual relations,

Table II. *Descriptive statistics for the psychometric scales (*n = *101) and PASI scores (*n = *48)*[b]*, and for the 3 categories of pruritus; low- (VAS 0<4,* n = *47), medium- (VAS ≥4< 7,* n = *24) and high-level (VAS ≥7,* n = *30). Results from 1-way ANOVA analyses for the categories of pruritus, using Tukey's test to identify pairwise significant differences*

		Level of pruritus (VAS)			ANOVA Mean difference (*p*) (95% CI)		
	Total Mean ± SD	Low Mean ± SD	Medium Mean ± SD	High Mean ± SD	Low vs. medium	Medium vs. high	High vs. low
State- and Trait anxiety Inventory							
State anxiety	38.0 ± 12.1	33.9 ± 10.2	38.5 ± 11.1	44.0 ± 13.5	n.s.	n.s.	10.1 (0.001) (3.7–16.5)
Trait anxiety	36.5 ± 11.9	32.8 ± 9.7	37.0 ± 11.5	41.8 ± 13.8	n.s.	n.s.	9.0 (0.003) (2.7–15.4)
Beck Depression Inventory-II							
Total scores	8.4 ± 8.1	5.0 ± 5.0	9.6 ± 8.1	12.8 ± 9.7	n.s.	n.s.	7.8 (<0.0001) (3.7–12.0)
Cognitive-affective scores[a]	4.3 ± 4.9	2.6 ± 3.1	4.8 ± 5.1	6.6 ± 6.2	n.s.	n.s.	4.0 (<0.0001) (1.4–6.6)
Swedish universities Scales of Personality							
Somatic trait anxiety	51.2 ± 10.8	48.0 ± 10.2	52.7 ± 10.7	55.1 ± 10.5	n.s.	n.s.	7.2 (0.011) (1.4–13.0)
Psychic trait anxiety	47.5 ± 9.9	45.9 ± 10.6	48.8 ± 9.2	49.1 ± 9.5	n.s.	n.s.	n.s.
Stress susceptibility	50.7 ± 10.9	48.5 ± 11.5	50.5 ± 10.3	54.3 ± 10.0	n.s.	n.s.	n.s.
Lack of assertiveness	47.0 ± 9.9	46.7 ± 9.5	48.5 ± 10.9	46.3 ± 9.6	n.s.	n.s.	n.s.
Impulsiveness	50.8 ± 9.9	48.7 ± 8.2	53.0 ± 10.6	52.4 ± 11.4	n.s.	n.s.	n.s.
Adventure seeking	49.7 ± 9.3	49.0 ± 8.1	49.9 ± 10.3	50.6 ± 10.6	n.s.	n.s.	n.s.
Detachment	47.0 ± 10.2	44.2 ± 10.6	52.6 ± 6.6	46.8 ± 10.5	8.3 (0.003) (2.5–14.1)	n.s.	n.s
Social desirability	51.2 ± 9.7	52.2 ± 8.8	51.7 ± 7.4	49.0 ± 12.4	n.s.	n.s.	n.s
Embitterment	50.6 ± 10.1	47.1 ± 6.9	52.6 ± 10.3	54.4 ± 12.4	n.s.	n.s.	7.4 (0.004) (2.0–12.7)
Trait irritability	49.3 ± 10.4	47.5 ± 9.9	50.6 ± 8.4	51.0 ± 12.5	n.s.	n.s.	n.s.
Mistrust	48.9 ± 11.6	44.9 ± 10.3	52.8 ± 9.9	52.1 ± 13.1	7.9 (0.016) (1.2–14.5)	n.s.	7.2 (0.017) (1.1–13.4)
Verbal trait aggression	49.5 ± 10.7	47.3 ± 8.8	51.3 ± 10.7	51.7 ± 12.9	n.s.	n.s.	n.s.
Physical trait aggression	48.0 ± 10.2	44.5 ± 7.0	51.8 ± 11.4	50.5 ± 11.9	7.3 (0.010) (1.4–13.1)	n.s.	6.0 (0.027) (0.6–11.4)
PASI	(*n* = 48)	(*n* = 24)	(*n* = 13)	(*n* = 11)			
Mean ± SD, median (range)	5.4 ± 4.3 4.2 (0–21.7)	4.6 ± 3.6 4.0 (0–14)	4.8 ± 2.6 4.2 (1.2–9.5)	7.4 ± 6.6 4.4 (0.9–21.7)	n.s.	n.s.	n.s.

[a]Cognitive-affective scores of the BDI-II: somatic items excluded (see complete explanation in Methods). [b]Performed only in patients recruited in autumn 2009.

PASI: Psoriasis Area and Severity Index; VAS: visual analogue scale; n.s.: non-significant at a level of $p < 0.05$.

Table III. *Results from logistic regression analysis with high-level pruritus (VAS ≥ 7) as dependent variable (*n = *101)*

	OR	95% CI	*p*-value
Age	1.00	0.97–1.04	0.86
Gender	0.70	0.25–1.93	0.49
Depression BDI-II ≥ 20	4.82	1.12–20.80	0.035
Sleep disturbances	2.85	1.00–8.14	0.050
Psoriasis impact on daily life	2.77	0.87–8.82	0.085
Psoriasis impact on sexual relations	3.89	1.11–13.64	0.034

BDI-II: Beck Depression Inventory-II scores ≥20; VAS: visual analogue scale; OR: odds ratio; CI: confidence interval.

15 out of 27 (56%) reported high-level pruritus. In the group that reported low impact on sexual relations, 15 out of 74 (20%) reported high-level pruritus ($p = 0.001$).

Forty-one (84%) of the 48 patients scored with PASI had mild, and 7 (15%) had moderate to severe plaque psoriasis. No significant differences were found in PASI scores with regard to group comparisons of pruritus (Table II). There were no significant correlations between PASI scores and scores of state- and trait anxiety or BDI-II. PASI scores correlated weakly only with SSP–Embitterment (rho = 0.32, $p = 0.024$) and SSP–Detachment (rho = 0.29, $p = 0.043$), but not with the remaining 11 personality traits.

DISCUSSION

This study reveals that patients with psoriasis with intense pruritus also report significantly higher scores for depression and anxiety, and show personality traits of somatic anxiety, embitterment, mistrust, and physical trait aggressiveness.

High-level pruritus was also significantly associated with high depressive scores of the BDI-II when excluding the somatic items from the scale (37, 38). In multivariate analysis, high depressive scores was the strongest explanatory psychometric variable for high-level pruritus, hence depression appears to be the most relevant affective trait in this study. Associations between depression and pruritus have been shown previously, both with regard to psoriasis (4, 31) and other chronic inflammatory dermatoses (27, 28). Depression may certainly be a result of living with severe pruritus; however, increasing evidence indicates that depression and negative emotionality may be predictive of, rather than consequences of, pruritus in inflammatory dermatoses (4, 19, 27, 29, 30).

Personality traits of somatic anxiety, mistrust and embitterment were significantly associated with high-level pruritus in ANOVA analyses of this study. However, this association was not seen in logistic regression analyses, which may be explained by the strong positive correlation with depression and these traits. To our knowledge, no previous study has yet examined the relationship between pruritus intensity and personality profile in psoriasis, as assessed by a more extensive structured personality inventory like the SSP-scale. Janowski et al. (44) recently used the NEO-Five Factor Inventory, and did not find any significant associations between basic personality traits and pruritus in 174 patients with psoriasis. Yet certain personality characteristics, such as high self-consciousness and aggressive traits, were recently identified as predictors of experimentally induced scratching in patients with atopic dermatitis (30). We consistently found a significant association between physical trait aggressiveness and high-level pruritus in our study, which is in accordance with results of previous studies (31, 45).

Psychosocial factors and negative life-events have been found to be strongly associated with itch in the community in a large Norwegian population-based cross-sectional study (46). In our study, no psychosocial factors could be associated with high-level pruritus, except regarding a negative relationship with the father. However, this may be a random finding.

The neurophysiological mechanism underlying the onset of pruritus appears to be a bi-directional sensory neurone – mast cell interaction, involving various endogenous substances, including cytokines and neuropeptides, such as substance P (21–26, 47). Neuropeptides are also altered in depression and anxiety (48), and the presence of inflammatory responses and the crucial role of cytokines in major depression have been addressed in several studies (49, 50). Hence, this may provide a physiological basis for the way in which emotional states may affect the perception of pruritus.

Subjective reporting using the VAS will always involve some degree of scientific uncertainty regarding the potential influence of personality traits, current mood or other circumstances on the scores obtained (33, 51). In this study, the total study sample showed a homogeneous personality profile, and the study participants were not more anxious or depressed than the general population (35, 36). Thus, it may be assumed that our patients represented a psychiatrically normal sample in further analyses of pruritus and interpretation of results. We chose to use the VAS because of its validated reliability (33, 51) and simplicity in clinical practice. However, since VAS only provides monodimensional information about itch intensity, it would be interesting to combine VAS with other assessment tools in future studies (52).

In this study, no significant association between PASI scores and intensity of pruritus was found. This is consistent with several previous studies where pruritus intensity was not significantly associated with disease severity (3, 6, 10). PASI scores were only estimated in the latter half of our study sample (48%), which is a limitation. However, all patients were interviewed during the same time of year, i.e. early autumn, which might implicate relatively similar levels of disease severity

in the entire sample. Most of the 48 patients scored had PASI scores representing mild disease; hence this variable was not used in the logistic regression analysis, which may be a limitation. However, PASI has often not been significantly associated with psychological morbidity in previous studies (53–55). It is interesting however, that as much as 30% of our patients experienced high-level pruritus, when the great majority of patients had very few skin lesions. This reinforces the theory of an associated psychological aetiology of pruritus in psoriasis.

Some previous studies have used control groups to compare psychological symptoms and pruritus. When using well-validated instruments (35, 36, 40), there is no need for a control group, since normative data are available. Moreover, in this study we wanted to compare patients within the same cohort, i.e. patients with psoriasis and different levels of pruritus.

The methodological strengths of this study are the high participation rate (93%) and that all patients were interviewed by the same researcher. High participation rate is important in psychological research, due to risk of selection bias because of psychological vulnerability (40).

Conclusion

According to our results, patients with psoriasis and severe pruritus might have a more vulnerable psychological constitution. This finding suggests important opportunities for clinicians to identify patients who might benefit from psychological interventions.

Larger prospective studies on this area would be beneficial, also with different assessments of pruritus.

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