

## CLINICAL REPORT

# Pruritus, Personality Traits and Coping in Long-term Follow-up of Burn-injured Patients

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**Pruritus is a major problem after burn injury; however, prevalence and predictors of prolonged pruritus are not known. The aims were to assess frequency of pruritus and the role of personality traits and coping in prolonged pruritus. The participants were burn patients injured 1–18 years earlier ( $n=248$ ). Pruritus was assessed with an item from the Abbreviated Burn Specific Health Scale, personality was assessed with the Swedish universities Scales of Personality, and coping with the Coping with Burns Questionnaire. In all, 60% of the participants had pruritus at follow-up, however as the time after injury increased, the number of patients with persistent itch decreased. In logistic regression, 39% of the likelihood of having persistent pruritus was explained by greater extent of burn, less time after injury, and psychological features (being less assertive, and using more instrumental but less emotional support). In summary, chronic burn-related pruritus is rather common and psychological factors such as anxiety-related traits and coping are significantly associated with its presence. Key words: anxiety; burn injury; itch; stress; trauma.**

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Pruritus can be defined as ‘an unpleasant sensation with the urge to scratch’, and it is represented by mechanisms in the cerebral cortex leading to motor responses to alleviate the problem (1). It is a subjective, pervasive and sometimes disabling symptom that is associated with a number of illnesses and somatic conditions (2, 3). Severe pruritus may also result from physical trauma to the skin. Most burn patients develop pruritus during the rehabilitation phase after the injury and the incidence in adult burn patients has been reported to be as high as 87% after discharge from hospital (4). Pruritus is most severe immediately after wound closure, after which it gradually diminishes (5). The

rebuilding of the skin continues for an extended time period, and pruritus sometimes persists up to 18 months after the burn (6). However, the clinical impression is that some patients continue to have severe pruritus even after several years.

Pruritus after burn injury has been associated with some injury-related factors, such as the extent of body surface area burned, time until wound closure, and the localization of the burn (4), but the underlying mechanism of pruritus is not well known. Recent findings regarding general pruritus suggest that there are itch-specific neurons that are sensitized by the release of histamine (7). In the early phases of recovery after a burn injury, pruritus may be largely explained by the release of histamine, as it is associated with excessive or prolonged wound healing processes, for instance during infection and in hypertrophic scarring (8). Pruritus may also be enhanced by central mechanisms such as inhibition of burn pain through the use of opioids (5, 7).

When pruritus becomes chronic it has been suggested that psychological factors are of increased importance (6, 9). Examples of factors that have been associated with increased pruritus are stressful life events, emotional stress, psychiatric symptoms such as depression and anxiety, and personality features such as interpersonal sensitivity, neuroticism and hostility (10–12). The impact of stress has also been established in healthy controls; for instance, it has been shown that experimentally induced pruritus increases after experiencing a mental stressor (13). However, it is not known if these associations also apply for the prolonged pruritus that sometimes accompanies a severe burn injury.

Pruritus may cause great distress in recovering burn patients. It may affect their ability to concentrate, and thereby their ability to function well in everyday life. It may also disrupt sleep, which is vital to recovery after a major trauma, and scratching may damage the newly developed skin (5), further prolonging the healing process. Available treatments such as antihistamine therapy, antibiotics, pressure garments, and skin cream can reduce pruritus in some patients. However, far from all patients benefit (4, 14–16).

Pruritus is most common during the first few years

after the burn, but there is limited information about its development in later stages. With time, the impact of the burn event and the injury may decrease and give way to individual factors such as personality and coping. The aims of this study were to describe the frequency of pruritus many years after recovery from a severe burn injury, and to explore the role of personality traits, existing coping strategies, and individual characteristics in reported pruritus.

## MATERIALS AND METHODS

### *Participants and procedure*

The participants were former burn patients treated at the Burn Unit at Uppsala University Hospital between 1980 and 1995. The sample has been described in detail previously (17). In brief, all patients fulfilled the following criteria: 1) 18 years or older at follow-up, and 2) total body surface area burned (TBSA)  $\geq 10\%$  and/or a length of stay in the Burn Unit  $\geq 7$  days. In 1996, 248 (74.3%) former patients answered a health survey comprising 94 questions from different versions of the Burn Specific Health Scale (18, 19), one question of which concerned pruritus. The evaluation of pruritus took place on average 9.3 (range 1–18) years after injury.

Of the 248 respondents, the 227 individuals who were older than 15 years of age at the time of injury were approached a second time in 1999 in order to assess personality and coping. Details of the 161 subjects who responded (70.9%) are found elsewhere (20). In brief, the assessment was performed on average 11.4 (range 3–19) years after injury. The respondents' average TBSA was 24.0% (SD=16.0, 0.5–85), of which 7.2% (SD=9.4, 0–72) were full-thickness burns (TBSA-FT), i.e. down to the subcutaneous tissue. Mean length of stay in the Burn Unit was 29.8 days (SD=25.0, range 1–148).

The study was performed according to the principles of the

Helsinki declaration and was approved by the Uppsala University Ethics Committee.

### *Measures*

*Pruritus.* Pruritus at follow-up was measured with one question adapted from the Abbreviated Burn Specific Health Scale (18) that now reads: 'My burn itches a lot' and was rated on a scale of 0 to 4, where 0='all the time' and 4='never' (17).

*Personality.* The Swedish universities Scales of Personality (SSP) (21) contains 91 items divided into 13 scales, with seven items each: 1) Somatic Trait Anxiety, 2) Psychic Trait Anxiety, 3) Stress Susceptibility, 4) Lack of Assertiveness, 5) Embitterment, 6) Trait Irritability, 7) Mistrust, 8) Detachment, 9) Impulsiveness, 10) Adventure Seeking, 11) Social Desirability, 12) Verbal Trait Aggression and 13) Physical Trait Aggression (Table I). The items were rated on a scale of 1='Does not apply at all', to 4='Applies completely'. The SSP has been standardized in a representative national sample and the internal consistency in terms of Cronbach's alpha ranges between 0.59 and 0.84 (21). T-scores are calculated for each gender separately. In Willebrand et al. (22) the present data were also adjusted for age.

*Coping.* The Coping with Burns Questionnaire (CBQ) is designed to measure coping after discharge from hospital, and some items are burn- or trauma-related. The CBQ consists of 33 items and six scales derived in factor analysis: Emotional Support, Optimism/Problem solving, Avoidance, Reevaluation/Adjustment, Self-Control and Instrumental Action (Table I). Internal consistency is moderate to high with alpha values ranging from 0.56 to 0.83 (23). The participants were instructed to think back to the time when they were discharged from hospital, to think about the problems they faced and how much they used the strategies described

Table I. *The Swedish universities Scales of Personality (SSP) and the Coping with Burns Questionnaire (CBQ)*

Subscales	Description of subjects with high scores (adopted from (21))
<i>SSP subscales:</i>	
Somatic Trait Anxiety (STA)	Autonomic disturbances, restless, tense
Psychic Trait Anxiety (PsTA)	Worries, anticipates, lacks self-confidence
Stress Susceptibility (SS)	Easily fatigued, feels uneasy when urged to speed up
Lack of Assertiveness (LA)	Lacks assertiveness in social situations
Detachment (D)	Avoids involvement with others, withdrawn, 'schizoid'
Social Desirability (SD)	Socially conforming, friendly, helpful
Embitterment (E)	Dissatisfied, blames and envies others
Trait Irritability (TI)	Irritable, lacks patience
Mistrust (M)	Suspicious, distrusts people's motives
Impulsiveness (I)	Acts on the spur of the moment, non-planning, impulsive
Adventure Seeking (AS)	Avoids routine, has a need for change and action
Verbal Trait Aggression (VTA)	Gets into arguments, berates people when annoyed
Physical Trait Aggression (PhTA)	Gets into fights, starts fights, hits back
<i>CBQ subscales:</i>	
Emotional Support (ES)	Seeks support of the emotional kind
Optimism/Problem solving (OP)	Makes efforts to solve problems, optimistic view of the future
Avoidance (AV)	Daydreams, wishful thinking, substance use, avoids people/activities
Reevaluation/Adjustment (RA)	Adjusts to injury, seeks the meaning of life, tries not to think about difficulties
Self-Control (SC)	Restrained expression of feelings
Instrumental Action (IA)	Seeks practical help/advice, instrumental problem solving

in each item. Items were rated on a scale of 1='Does not apply/not used', to 4='Used a great deal'.

### Statistical analysis

The pruritus ratings were categorized in two ways, rendering two alternative analyses. Firstly, the ratings of pruritus were dichotomized (pruritus rating 0–3=yes, 4=no). Secondly, the ratings were divided into three groups: ratings of 0 ('all the time') and 1 ('most of the time') were categorized as persistent pruritus, ratings of 2 ('sometimes') and 3 ('seldom') were categorized as occasional pruritus and ratings of 4 ('never') equalled no pruritus.

Pruritus level was used as the dependent variable in logistic regressions performed according to the principles of Hosmer and Lemeshow (24). Background variables, personality traits and coping strategies were first evaluated as potential predictors of pruritus level in simple regressions (Table II). Those having a  $p$  value  $<0.25$  were subsequently included into multiple logistic regressions with backward stepwise elimination of psychological variables. In the first analysis, 'no pruritus' (always logit 0) was contrasted with 'pruritus' (logit 1), in the second analysis 'no pruritus' was contrasted with 'occasional pruritus' (logit 1), and in the third it was contrasted with 'persistent pruritus' (logit 1). In the final model  $p < 0.05$  was considered statistically significant.

All variables that are entered in multiple regression affect

Table II. Simple logistic regressions with pruritus as dependent variable and background variables, personality (SSP) and coping (CBQ) as independent variables

No. of individuals	Pruritus <sup>1</sup>		
	Yes/No 98/68	Occasional/No 73/68	Persistent/No 25/68
<b>Background variables</b>			
Sex	0.220		0.153
Age at inquiry	0.078	0.024	
Time after injury	0.007	0.101	$<0.001$
TBSA	0.002	0.004	0.011
TBSA-FT	0.130	0.219	0.105
<b>SSP subscales<sup>2</sup></b>			
STA	0.005	0.024	0.006
PsTA	$<0.001$	0.001	0.008
SS	0.002	0.003	0.030
LA	0.005	0.020	0.007
D	0.093	0.033	
E	0.015	0.037	0.036
TI	0.003	0.007	0.019
M	0.089	0.185	0.105
I			-0.236
AS	-0.168	-0.075	
PhTA		0.243	
<b>CBQ subscales<sup>2</sup></b>			
ES			-0.223
AV	0.018	0.083	0.010
RA	0.117		0.028
IA			0.060

$p$  values  $<0.25$  are given;  $n=166$ . TBSA=total body surface area burned, TBSA-FT=total body surface area full thickness burned.

<sup>1</sup>All regressions were performed as binomial regressions, where 'no pruritus' was logit 0.

<sup>2</sup>Abbreviations for the SSP and CBQ subscales are presented in Table I.

the result even if an individual variable does not reach statistical significance. Therefore, the background variables were kept in all models even though they sometimes ended up being non-significant. As TBSA-FT was highly associated with total TBSA, and was less related to pruritus, the decision was made to consider total TBSA only.

## RESULTS

### Descriptive statistics

One hundred and three (42%) of the 248 individuals who responded to the first inquiry reported no burn-related pruritus, which corresponds to a rating of 4 in the questionnaire (4=never), 108 (44%) reported occasional pruritus, and 37 (15%) reported persistent pruritus. The relative number of individuals who experienced no pruritus increased over time from 21% in those investigated within 4 years to 56% in those investigated  $>12$  years after injury. Using the same time references, there was a slight decrease of patients reporting occasional pruritus (from 50% to 39%) and a considerable decrease of patients reporting persistent pruritus (from 29% to 5%) (Fig. 1).

The subgroup of 161 former patients who participated in the analysis of personality and coping had a virtually identical degree of pruritus as the entire sample of 248 individuals (data not shown).

### Presence or absence of pruritus

In the stepwise regression analysis the relevant background variables were entered first, and together explained 9% of the likelihood of having pruritus. Next, all relevant psychological variables were included. After backward elimination of non-significant variables, Psychic Trait Anxiety (positively), together with time after injury (negatively) and TBSA (positively), explained only 16.0% of the likelihood of having pruritus (Table III).

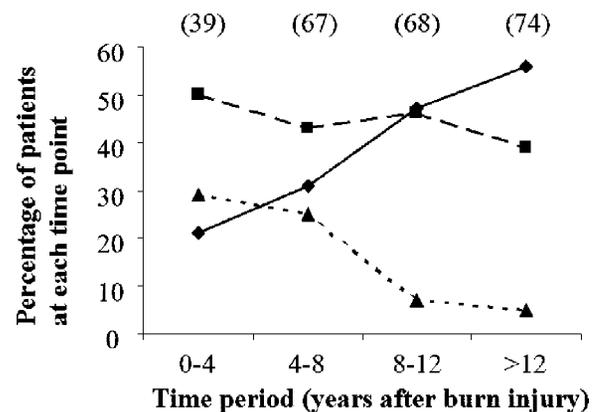


Fig. 1. Occurrences of pruritus at different time intervals after burn injury:  $\blacklozenge$ =no pruritus;  $\blacksquare$ =occasional pruritus;  $\blacktriangle$ =persistent pruritus. For categorization of pruritus, see Materials and Methods. Figures in brackets represent total number of patients in each time interval.

Table III. Multiple logistic regressions with pruritus as a dichotomized dependent variable or with either of the two levels of pruritus as the dependent variable

	Chi-square	p value	Association <sup>a</sup>	Cum. R <sup>2</sup>
Pruritus: Yes/No (n=160)				
Sex	0.1	ns		
Age at inquiry	1.1	ns		
Time after injury	5.6	0.018	-	
TBSA	8.5	0.004	+	
PsTA	12.9	<0.001	+	0.16
Occasional pruritus (n=140)				
Age at inquiry	2.5	ns		
Time since injury	1.8	ns		
TBSA	7.8	0.005	+	
PsTA	11.5	0.001	+	0.14
Persistent pruritus (n=89)				
Sex	0.2	ns		
Time after injury	8.9	0.003	-	
TBSA	6.3	0.012	+	
LA	5.6	0.018	+	
IA	7.0	0.008	+	
ES	4.2	0.039	-	0.39

Note: Due to missing values on some subscales the number of participants vary.

Background variables, personality and coping are independent variables. Final models are shown. Cum. R<sup>2</sup>=cumulative explained variance.

<sup>a</sup>A positive association (+) denotes that the variable contributes to more pruritus, whereas a negative association (-) denotes that it contributes to less pruritus.

#### No pruritus versus occasional or persistent pruritus

The background variables alone explained 8% of occasional pruritus. In the final model, Psychic Trait Anxiety (positively) and TBSA (positively) predicted 14% of occasional pruritus (Table III). For persistent pruritus, 21% of the variance was explained by the background variables. In the final model, as much as 39% of persistent pruritus was predicted by the neuroticism-related personality trait Lack of Assertiveness (positively), the coping strategies Instrumental Action (positively) and Emotional Support (negatively), time after injury (negatively) and TBSA (positively).

## DISCUSSION

The results reveal that pruritus remains a problem a very long time after severe burn injury. In the present study, more than half of the previously burned patients reported more or less regular burn-related pruritus on average 9 years after the injury. On the bright side, there were also signs of an improvement many years after the injury, in that the number of former patients reporting persistent pruritus decreased substantially after 8 years. However, these data were cross-sectional and need to be corroborated in longitudinal studies. Overall, chronic pruritus is less frequently reported in

burn victims than in skin disorders, e.g. atopic dermatitis, where all individuals report pruritus (25).

Furthermore, the investigation suggests that certain personality traits and coping strategies are associated with the reporting of prolonged post-burn pruritus. These factors contributed to the reporting of pruritus to a similar extent as did time after injury and extent of injury. The contributions of personality and coping were more pronounced in those with persistent pruritus than in those with occasional pruritus, and the predictive model was statistically stronger for persistent pruritus. This indicates that one should think of individuals with differing amounts of pruritus as comprising separate subgroups, and that individuals in these subgroups might benefit from different means of support or treatment. More specifically, the personality trait Psychic Trait Anxiety, i.e. to worry a lot in advance and display low self-confidence, predicted a higher likelihood of reporting occasional pruritus. Persistent pruritus was predicted by submissive personality traits (Lack of Assertiveness), being more inclined to seek practical help/advice and to utilize highly structured problem solving (Instrumental Action), and being less support seeking (Emotional Support).

A limitation of the present study is the retrospective assessment of coping, which most likely measures representations in memory of how the individual coped, rather than the actual strategies employed. It is therefore possible that the assessment of coping is biased towards what the person remembers about his/her coping efforts. Another possible limitation is the fact that personality was measured after, not before, the burn. The results are therefore statistical predictions based on the assumption that personality traits are fairly stable, as has been shown previously (26).

There is no consistent support for the early psychological theories that suggested that a certain personality type or unconscious conflict in itself could be associated with specific dermatological problems. However, using modern psychological conceptualizations of stress and adaptation, several relevant findings have emerged. As cited in the introduction, the experience of stress is experimentally associated with increased pruritus (13), and stress-related personality traits (i.e. anxiety proneness) have been associated with the development of the vicious circle in which scratching leads to pruritus and further scratching (27). Also, new integrative knowledge proposes a link between specific immunological response patterns, personality and dermatological vulnerability (12). This would be a most interesting area to investigate further in burn patients with prolonged pruritus.

There are few tools for measuring pruritus and most are focused on pruritus *intensity*. Several investigators have used a visual analogue scale (VAS) (4, 28). Recently, Yosipovitch et al. (29) have transformed the

content of the short form of the McGill Pain Questionnaire to assess various aspects of pruritus, including a VAS to assess intensity. In contrast to these instruments, the current assessment focused on *frequency* of pruritus. In this health evaluation the initial aim was to investigate if prolonged pruritus was at all present, and in-depth examination of single symptoms was not possible. Frequency of pruritus may have some advantages compared to intensity when assessed with only one question, for instance it may be less influenced by fluctuations in severity and the participants' use of different reference values such as average or peak pruritus. However, in future studies it would be preferable to use a more elaborate assessment, including both frequency and intensity of pruritus. The item 'my burn itches a lot' is phrased in a leading manner and it is possible that this increases the participants' ratings. However, since time after injury is very long and the condition is stabilized, it can be supposed that the participants are well aware of their itching problem, if any. In addition, the leading phrase is consistent with the item 'I have a lot of itching' and other items in the original Abbreviated Burn Specific Health Scale (18).

Treatment of burn-related pruritus has mostly been studied during the early stages of recovery, when pruritus is most common. There have recently been some successful trials with an eutectic mixture of the local anaesthetics lignocaine and prilocaine (EMLA<sup>®</sup>) (30), massage (28) and transcutaneous nerve stimulation (31). Few studies pertain to the problem of chronic pruritus, and no controlled study of psychological interventions in burn-related pruritus could be found in the literature. However, in the treatment of burn *pain* there have been positive results with the use of techniques such as relaxation, distraction, and hypnosis (32), all of which aim to enhance the individual's coping skills and to minimize the perception of pain. Both burn-related pain and pruritus can be maintained by vicious circles of compensatory behaviours, such as the scratch-itch-scratch circle for pruritus and the use of avoidant behaviour for chronic pain (33). The comparison is tentative because unlike pain pruritus does not lead to an avoidant motor reaction (1), although both initiate a motor response (2). Also, there are fundamental differences (even opposing mechanisms) in the neuronal pathways between these two sensations (7, 34) that might have implications for the design of interventions. However, taking into account the contribution of psychological factors seen in this study, the potential benefit of psychological or psychopharmacological interventions as adjuncts in the treatment of chronic burn-related pruritus should be explored.

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