

Are patients with chronic pruritus more susceptible to social stress than healthy controls? An experimental case-control study

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DEAR EDITOR, Previous research suggests associations between stress and pruritus in population samples¹ and in patients with atopic dermatitis (AD),^{2–4} but research is lacking for patients with chronic pruritus (CP) of other origin.

Therefore, we investigated acute and chronic stress levels and physiological stress measures [i.e. heart rate variability (HRV)] of patients with CP and healthy controls (HCs). We expected higher levels of chronic stress and acute stress in a standardized experimental stress test for patients with CP, which should also be reflected by differences in the stress-sensitive HRV parameters.⁵

Participants were informed about the outline of the study design and that the aim of the study was to examine the effects of stress on the function of the nervous system. The study also comprised quantitative sensory testing and other questionnaires, which will be reported elsewhere. Overall, 33 patients with generalized CP (19 women) and 30 HCs (19 women) participated. There were no significant age and sex differences between the groups. According to the clinical classification of the International Forum for the Study of Itch (IFSI),⁶ 13 patients were classified as IFSI group II (CP on nonlesional skin), nine as IFSI group I (CP with primarily altered skin) and 11 as IFSI group III (chronic scratch lesions). The local ethics committee approved the study, which was performed in accordance with the Declaration of Helsinki and the guidelines for Good Clinical Practice. The study was registered in the German Register for Clinical Studies under the number DRKS00013194.

Participants underwent the Trier Social Stress Test (TSST),⁷ which consists of a job interview and a mathematical task. Before and after the TSST they provided visual analogue scale (VAS) scores (0–10) that assessed current itch intensity, desire to scratch, subjective strain, mood and stress intensity and the Trier Inventory for the Assessment of Chronic Stress (TICS).⁸ Heart rate was recorded continuously by a three-canal electrocardiogram from before the TSST until 1 h after completion of the test and HRV parameters were calculated.⁵

Results are reported in Table 1. Patients with CP did not report more chronic subjective stress in the TICS than HCs. In expectation of the acute stress test, patients with CP reported more tension and subjective stress, which is in line with the

lower HRV measures before the stress test (lower root mean square of successive differences, SD of R–R intervals, low frequency and high frequency). Tension, subjective stress and heart rate increased significantly from before to after the TSST and HRV parameters changed significantly in both groups, without significant intergroup differences.

In patients with CP, mean pruritus intensity and the desire to scratch did not change significantly from before to after the TSST [pruritus intensity 3.23 (median 3.0, SD 2.71) before TSST and 3.16 (median 3.0, SD 2.74) after TSST (*t*-test for paired samples *t* = 0.17, *P* = 0.864); desire to scratch 3.01 (median 1.65, SD 3.22) before TSST and 3.22 (median 2.0, SD 3.11) after TSST (*t* = −0.42, *P* = 0.681)].

Our results indicate an increased susceptibility of patients with CP to the expectation of an acute stressor, as shown by subjective stress measures and physiological measures before the TSST. This is in line with our hypothesis and other research on AD.⁴ The significant changes in VAS and HRV measures from before to after the TSST showed a successful stress induction in both groups. Similar results have been reported for AD.³

However, the increased tension and stress before the TSST did not modify the itch intensity and desire to scratch from before to after the stressor in the 33 patients with CP. This result does not necessarily exclude the influence of acute stress on pruritus in CP. The TSST is only one possible kind of social stressor, which has the advantage of being a standardized test, i.e. the situation is the same for all individuals. However, the factors that may cause stress in an individual can be highly subjective. Perhaps the application of individualized stressors might have yielded other results. Also we asked only for the desire to scratch but did not include objective measures of scratching, e.g. videotaping. The study did not include a longer follow-up, so we cannot exclude delayed effects of stress on pruritus perception and scratching. In AD a significant increase in the percentage of affected skin was detected 24 h after the stress exposure but without change in pruritus severity.³ Further limitations of this study include the small sample size and perhaps also the different financial compensations for the participants (€50 for CP and €70 for HC).

With regard to chronic stress, patients with CP did not report higher subjective stress levels for the previous 3 months for different stress domains (e.g. related to work or relationships). However, the TICS does not ask for symptom- or disease-specific stress and might miss specific pruritus-related stressors in CP.

Table 1 Results of the subscales of the Trier Inventory for Chronic Stress (TICS) and the visual analogue scale (VAS) scores for tension, mood, acute stress and the measures of heart rate variability (HRV) before and after the Trier Social Stress Test (TSST)

	Healthy controls (HCs) (n = 30)		Patients with chronic pruritus (CP) (n = 33)		HC vs. CP t-test for independent groups			
	Mean	SD	Mean	SD	t-test	P-values		
TICS								
Work overload	9.54	5.45	11.50	7.62	-1.67	0.248		
Social overload	8.13	4.73	9.46	5.24	-1.05	0.298		
Performance pressure	13.37	8.27	13.08	6.90	0.15	0.882		
Work discontent	9.27	4.92	8.86	5.40	0.31	0.756		
Overtaxing at work	4.33	3.28	5.84	4.70	-1.46	0.149		
Lack of social recognition	4.20	2.81	5.07	3.76	-1.03	0.307		
Social tensions	4.80	3.40	6.64	5.86	-1.50	0.138		
Social isolation	6.10	5.77	6.30	4.55	-0.15	0.881		
Chronic worries	4.20	3.37	4.97	3.88	-0.84	0.406		
Screening scale								
Chronic stress	11.07	7.69	14.13	9.21	-1.42	0.159		
VAS scores before TSST	Mean	SD	Mean	SD	t-test	P-values		
Tension	1.08	1.17	2.44	2.34	-2.96	0.005		
Mood	6.25	1.90	6.46	2.19	-0.39	0.695		
Stress	0.72	0.68	2.71	2.91	-3.81	0.001		
HRV scores before TSST								
Average heart rate	78.31	11.07	78.79	11.58	-0.16	0.878		
RMSSD	38.24	27.03	25.48	17.77	2.06	0.044		
SDRR	56.37	26.08	44.26	16.35	2.06	0.044		
VLF	2574.75	3604.56	1326.12	916.34	1.77	0.082		
LF	5044.41	5455.12	1822.47	1736.84	2.91	0.005		
HF	1913.35	2941.84	732.56	780.90	2.05	0.046		
LF/HF ratio	5.27	5.81	5.28	5.49	-0.01	0.992		
UNIANOVA								
Test for relation to score before TSST					Test for group differences			
VAS scores after TSST	Mean	SD	Mean	SD	F-values	P-values	F-values	P-values
Tension	6.09	2.72	6.48	2.53	12.91	0.001	0.41	0.525
Mood	5.04	2.57	5.03	2.41	0.23	0.634	0.002	0.964
Stress	5.56	2.92	6.02	2.44	5.16	0.027	0.11	0.745
HRV scores after TSST								
Heart rate	91.18	14.74	95.56	18.89	28.37	0.001	0.97	0.330
RMSSD	25.59	16.08	19.92	14.65	26.25	0.001	0.06	0.802
SDRR	49.43	19.67	39.78	17.02	15.85	0.001	1.23	0.273
VLF	2479.72	3659.52	1531.80	1884.49	1.15	0.290	0.77	0.386
LF	2682.70	2267.12	2256.58	2372.05	10.08	0.003	0.02	0.898
HF	744.09	820.73	613.97	1255.62	10.16	0.002	0.15	0.698
LF/HF ratio	6.03	3.80	7.17	6.17	21.54	0.001	0.99	0.324

RMSSD, root mean square of successive differences; SDRR, SD of R-R intervals; HF, high frequency; LF, low frequency; VLF, very low frequency. TICS results and values before the TSST. Comparison of patients with CP and HCs using t-test for independent groups. After the TSST, values were obtained using a univariate variance analysis (UNIANOVA) with covariate score before TSST and test for group differences (HCs vs. patients with CP). Bold indicates significant P-values.

Further research is needed to elucidate the complex relationship between stress and pruritus in CP.

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