

## The Pleasurability of Scratching an Itch Amongst Different Pruritic Conditions

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Chronic itch is a debilitating symptom with a significant impact on quality of life and function (1). Interestingly, the behavioral response to itch (i.e. scratching) can be pleasurable, and patients often report scratch pleasurability (2). Scratch pleasurability may vary depending on the underlying etiology causing itch, however data on the pleasurability of scratching according to chronic itch diagnosis is unfortunately currently lacking. In a large study of atopic dermatitis and psoriatic patients, scratching was considered pleasurable in both diseases, and pleasurability correlated weakly with itch intensity in atopic dermatitis (3). Scratch pleasurability also differs in body locations and may be associated with topographical differences of itch (2, 4). Its characteristics amongst other common pruritic skin conditions have not been well studied. The purpose of this study was to examine differences in scratch pleasurability ratings amongst different pruritic conditions. A secondary outcome of this study was to examine the overall association of scratch pleasurability to itch intensity.

### MATERIAL AND METHODS

We used cross-sectional survey data collected from 459 adult patients with chronic pruritus at the University of Miami from November 2017 to December 2019. Chronic itch was defined as itch lasting >6 weeks. Patients were grouped based upon their chronic itch diagnosis (Table I). Validated survey data on the

extent to which scratching was pleasurable was recorded on a linear scale from -5 (not pleasurable at all) to +5 (extremely pleasurable), and data on 24-h average itch severity and 24-h worst itch severity was recorded on a linear scale from 0 (no itch) to 10 (worst itch imaginable) (5). The differences in scratching pleasurability within each chronic itch diagnosis were compared using a two-sample *t*-test when normality and homogeneity assumptions were satisfied; otherwise, the Mann-Whitney *U* test was used. One-way ANOVA or Kruskal-Wallis test was used for comparison across the chronic itch groups. Pairwise comparisons were Bonferroni corrected. Spearman's correlation was presented to correlate scratch pleasurability with itch intensity. A *p*-value below 0.05 was considered significant.

### RESULTS

Upon comparison of mean pleasurability scores between itch diagnoses, patients with notalgia paresthetica had significantly increased scratch pleasurability ratings compared to all other patients with chronic itch ( $3.5 \pm 1.8$ ;  $p=0.026$ ), while those with brachioradial pruritus had significantly decreased scratch pleasurability ratings compared to all other patients with chronic itch ( $1.2 \pm 3.1$ ;  $p=0.031$ ). Amongst patients who suffered from either scalp, anal, or genital itch (Table II), patients with scalp itch had significantly decreased scratch pleasurability ratings ( $1.7 \pm 2.9$ ,  $p=0.042$ ) compared to the anal area ( $2.2 \pm 4.0$ ) and vulva/scrotum ( $1.9 \pm 3.1$ ). Amongst the skin rashes, patients with lichen simplex chronicus rated their scratch pleasurability as high ( $3.4 \pm 2.3$ ) while patients with urticarial eczematous dermatitis rated their scratch pleasurability as low ( $1.1 \pm 3.0$ ). Neither patient sex nor patient age correlated significantly with scratch pleasurability ratings. When correlation coefficients were compared, moderate negative relationships were found between 24-h worst itch intensity and scratch pleasurability for itch of systemic disease ( $r=-0.403$ ,  $p=0.033$ ) and neuropathic itch not otherwise specified ( $r=-0.323$ ,  $p=0.037$ ).

**Table I. Scratch pleasurability ratings amongst different pruritic conditions**

Disease	Patients (total=459) <i>n</i>	Scratch pleasurability rating Mean $\pm$ SD	<i>p</i> -value
Atopic dermatitis	96	2.5 $\pm$ 2.4	0.210
Psoriasis	32	2.7 $\pm$ 2.8	0.281
LSC	14	3.4 $\pm$ 2.3	0.082
Prurigo nodularis	24	2.6 $\pm$ 2.2	0.426
Contact dermatitis	16	2.1 $\pm$ 3.0	0.989
Urticaria	24	1.9 $\pm$ 3.0	0.644
UED	10	1.1 $\pm$ 3.8	0.242
Seborrheic dermatitis	19	2.2 $\pm$ 2.4	0.971
CPUO	62	2.3 $\pm$ 2.7	0.543
Notalgia paresthetica	21	3.5 $\pm$ 1.8	<b>0.026</b>
BRP	38	1.2 $\pm$ 3.1	<b>0.031</b>
Neuropathic itch of scalp or genitals	18	2.1 $\pm$ 3.1	0.903
Neuropathic itch not otherwise specified	42	1.7 $\pm$ 3.4	0.261
Systemic disease	28	1.6 $\pm$ 2.9	0.343
Psychogenic itch	16	1.6 $\pm$ 3.2	0.464

LSC: lichen simplex chronicus; UED: urticarial eczematous dermatitis; CPUO: chronic pruritus of unknown origin; BRP: brachioradial pruritus; SD: standard deviation.

**Table II. Scratch pleasurability ratings amongst those with scalp, anal, or genital itch**

Location	Patients (total=162) <i>n</i>	Scratch pleasurability rating Mean $\pm$ SD	<i>p</i> -value
Scalp	144	1.7 $\pm$ 2.9	<b>0.042</b>
Anal area	5	2.2 $\pm$ 4.1	0.959
Vulva/scrotum	13	1.9 $\pm$ 3.0	0.784

## DISCUSSION

Central mechanisms are involved in the phenomenon of scratching pleasure. Brain imaging studies in healthy and chronic itch patients found that scratching activated brain regions involved in the reward system (i.e. striatum, mid-brain) (6). Furthermore, higher activity during scratching in chronic itch patients versus healthy controls was noted in brain regions related to motor control, motivation to act, and the reward system, providing an explanation for the sensation of pleasure often associated with scratching in chronic itch (7). Our study found that scratch pleasurability ratings were significantly increased in notalgia paresthetica and decreased in brachioradial pruritus. This difference is interesting given the fact that both of these diseases are characterized by similar etiologies, i.e. itch which is neuropathic in nature and relates to impingement of spinal nerves albeit in different locations. This finding will require additional larger scale studies to better understand why the subjective pleasurability response of these conditions differ. In addition, scratch pleasurability seemed to be significantly decreased in the scalp as compared to the genito-anal areas. Of note, the genital organs have C-tactile nerves that transmit pleasure and may be involved in pleasurability of scratching. Although only significant by trend ( $p=0.082$ ), scratch pleasurability in lichen simplex chronicus was extremely high; this finding is not surprising as dermatologic manifestations of this disease are the result of primary excessive scratching. Importantly, moderate negative relationships were found between 24-h worst itch intensity and scratch pleasurability for itch of systemic disease and neuropathic itch

not otherwise specified. Our study may be limited by the discrepancy in sample size for certain chronic itch diseases or body locations.

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