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A Retrospective Analysis of Itch Intensity and Comorbidities in Lichen Simplex Chronicus

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Lichen simplex chronicus is a chronic pruritic skin condition that significantly impacts quality of life. This retrospective study analysed 125 patients with clinically confirmed lichen simplex chronicus seen at a tertiary academic centre to characterize itch severity, anatomical distribution, and associated comorbidities. Itch intensity was assessed using the Numerical Rating Scale (NRS), and clinical data were stratified by demographics and disease extent. Most patients (75%) reported moderate-to-severe itch (NRS 4–10), with nearly 90% experiencing daily pruritus and half reporting both daytime and nocturnal symptoms. The limbs were the most commonly affected sites. Comorbid conditions were frequent, including generalized anxiety disorder (50% vs ~3% in the US adult population), major depressive disorder (44% vs ~8%), hypertension (61% vs ~45%), and type 2 diabetes (30% vs ~11%). Patients with multiple-lesion lichen simplex chronicus had significantly higher itch severity (mean NRS 7.81 vs 7.08, $p = 0.001$) and were more likely to be female (81% vs 46%, $p = 0.002$) compared with those with localized disease. These findings highlight the high symptom burden and frequent co-occurrence of psychiatric and metabolic comorbidities in lichen simplex chronicus. Thus, early identification and management of psychiatric, neurological, and metabolic conditions may improve outcomes for patients with lichen simplex chronicus.

Key words: chronic pruritus; comorbidities; itch intensity; itch localization; lichen simplex chronicus; multidisciplinary management.

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SIGNIFICANCE

Lichen simplex chronicus is a common skin disorder characterized by chronic itch, but its impact often extends beyond the skin. This study shows that patients with lichen simplex chronicus frequently experience psychiatric, neurological, and metabolic comorbidities, particularly those with more widespread disease. Individuals with multiple lesion lichen simplex chronicus reported more severe itch and higher rates of associated health conditions. These findings underscore the need for a multidisciplinary approach to lichen simplex chronicus management that addresses both dermatological symptoms and systemic health to improve overall patient outcomes.

Among the various chronic itch conditions, lichen simplex chronicus (LSC) is particularly prevalent, and in certain populations it is one of the leading itchy dermatological conditions (1–3). LSC is characterized by thick, scaly plaques that result from persistent scratching or rubbing of chronically itchy areas.

While LSC is not life-threatening, the intense pruritus it causes can greatly impact patients' quality of life (4–6). Effective itch management is critical, as continuous scratching exacerbates skin barrier disruption, releases inflammatory mediators, and perpetuates the itch–scratch cycle, further intensifying the condition (7–9). Additionally, it is crucial to evaluate the underlying causes of pruritus in LSC, as localized itching can indicate psychiatric, neurological, or malignant conditions (10).

This study aims to provide a comprehensive analysis of the clinical and demographic characteristics of patients diagnosed with LSC in the University of Miami Health System. Specifically, we seek to quantify itch intensity and compare itch characteristics across different groups, a topic that lacks sufficient literature except for LSC of the anogenital region (11) and clinical trials investigating efficacy of select treatments in relieving pruritus in LSC (12–15). By examining a diverse cohort of patients, we aim to identify patterns and associations that can inform better management strategies for LSC.

MATERIALS AND METHODS

The study focused on patients with LSC who sought care at the University of Miami Itch Center. Participants included in this study were required to meet the following criteria: (*i*) age over 18 years; (*ii*) have a diagnosis of lichen simplex chronicus associated with their electronic medical records.

During the period between January 2017 and February 2023, a total of 125 patients with the diagnosis of LSC were entered into the study database. LSC was diagnosed based on characteristic clinical findings, including chronic pruritus, well-demarcated lichenified plaques, and excoriations in predilection sites. In some cases, additio-

nal diagnostic evaluations, including skin biopsies and patch testing, may have been performed. However, only patients with clear clinical documentation of a primary diagnosis of LSC based on thorough chart review were included in this study. Patients failing to meet the diagnostic criteria or with incomplete data were systematically excluded. Data collected were de-identified and included the patient's sociodemographic factors, diagnosis, age at diagnosis, itch characteristics, dermatological clinical findings, and associated conditions.

Patients with a documented history of atopic eczema or other primary eczematous conditions were excluded from this study to examine comorbidities specifically associated with LSC without the confounding effects of atopic dermatitis.

Statistical analysis

We performed a descriptive statistical analysis of the clinical and demographic characteristics of the data. Categorical variables are expressed as percentages, and comparisons were conducted using the χ^2 test. For continuous variables, mean standard deviation (SD) or median (interquartile range) are provided. In addition to descriptive and comparative analyses across demographics, patients were stratified into 2 groups based on the extent of disease: localized LSC (involvement of 1 anatomical region) and multiple lesion LSC (involvement of more than 1 region). Comparisons between these groups were performed using independent samples *t*-tests for continuous variables and χ^2 tests for categorical variables. $P<0.05$ was considered statistically significant in all calculations. Data analysis was performed using Microsoft Excel® (Microsoft Corp, Redmond, WA, USA) and MedCalc Statistical Software® (MedCalc Software Ltd, Ostend, Belgium) platforms.

RESULTS

As delineated in **Table I**, our patient cohort represents a diverse group from all over southeastern Florida. Notably, approximately 70% identified as white, 20% as black, and 6% as Asian. Regarding ethnicity, around 30% self-identified as Hispanic, with the remaining 70% identifying as non-Hispanic. The majority of patients, over 50%, were aged 50 years or older, with a mean age of 56.6 ± 1.52 years and a median age of 58 years (interquartile range: 46–69). There was no remarkable sex predominance, with a female-to-male ratio of 1.12.

Itch intensity was assessed using the itch Numerical Rating Scale (NRS), which ranges from 0 to 10, with 10 being the worst. Nearly half, 61 out of 125 patients (49%), experienced itch intensity in the 7 to 10 (severe itch) range (see Table I). Itch frequency was classified as daily, weekly, or monthly. Some 111 out of 125 patients (89%) experienced daily pruritus, while 6 out of 125 (5%) experienced weekly pruritus. About half of the patients presented pruritus both during the day and at night (Table I).

Table I. Sociodemographic characteristics of lichen simplex chronicus patients

Demographic variables	Total number reported ($n=125$)	Frequency
Race, *n* (%)		
White	86/125	69%
Black	25/125	20%
Asian	8/125	6%
Hawaiian/ Pacific islander	1/125	1%
Not specified	5/125	4%
Ethnicity *n* (%)		
Hispanic	37/125	29%
Non-Hispanic	87/125	70%
Not specified	1/125	1%
Age, *n* (%)		
<20 years old	3/125	2%
21 to <30 years old	9/125	7%
31 to <40 years old	9/125	7%
41 to <50 years old	18/125	14%
51 to <60 years old	27/125	22%
61 to <70 years old	29/125	23%
71 to <80 years old	19/125	15%
>80 years old	11/125	9%
Sex, *n* (%)		
Female	66/125	53%
Male	59/125	47%
Smoking status, *n* (%)		
Yes	8/125	6%
Passive	1/125	1%
Quit	31/125	25%
Never	83/125	66%
Not specified	2/125	2%
Alcohol use, *n* (%)		
Yes	18/125	14%
No	101/125	81%
Not specified	6/125	5%
Body mass index, *n* (%)		
Obese	44/125	35%
Overweight	39/125	31%
Normal	34/125	27%
Underweight	1/125	1%
Not specified	7/125	6%
Itch intensity*, *n* (%)		
0 to 3 (mild)	2/125	2%
4 to 6 (moderate)	33/125	26%
7 to 10 (severe)	61/125	49%
Not specified	29/125	23%
Itch frequenc, *n* (%)		
Daily	111/125	89%
Weekly	6/125	5%
Monthly	0/125	0%
Not specified	8/125	6%
Itch timing, *n* (%)		
Daytime	21/125	17%
Nighttime	17/125	14%
Both	63/125	50%
Not specified	24/125	19%

*Measurement tool: Itch Numerical Rating Scale (NRS), scale from 0 to 10.

Pruritus severity was also evaluated across different age groups using itch NRS scores. Across most groups, the median NRS score hovers around the higher end of the scale, reflecting a generally high severity of itch. Overall, the mean NRS score was 7.02 ± 1.86, with a median of 7 (interquartile range: 6–8).

A statistically significant difference was observed in the distribution of LSC across various anatomical locations, with a higher number observed on the limbs

compared with the face/head/neck, genitalia, trunk, or other regions ($p<0.0001$). Among the 125 patients, 84 (67%) had lichen simplex chronicus (LSC) affecting the extremities. Of these, 14 (17%) had involvement of the hands, 22 (26%) the arms, 45 (54%) the legs, 9 (11%) the feet, 7 (8%) the ankles, and 5 (6%) the elbows. Additionally, the majority of LSC cases reported a duration exceeding 1 year ($p<0.0001$), and most LSC cases reported higher NRS scores, ranging from 6 to 10 ($p<0.0001$) (**Table II**).

The most common neurological, psychiatric, and comorbid conditions observed within our patient cohort are presented in **Table III**. Among the neurological conditions, lumbar radiculopathy stands out as the most common, affecting 11% of participants, with lumbar and cervical spondylosis following closely at 9% each. For psychiatric conditions, generalized anxiety disorder was reported by 50% of participants, and major depressive disorder affected about 44%. In terms of most common comorbidities, hypertension was the most frequent, reported by 61% of individuals, followed by type 2 diabetes at 30%, hyperlipidaemia at 26%, dyslipidaemia at 15%, and chronic kidney disease at 6%.

We further stratified patients by disease extent into those with localized LSC ($n=99$) and multiple-lesion LSC ($n=26$) (**Table IV**). Patients with multiple-lesion LSC reported significantly higher mean itch intensity (7.81 ± 1.85) compared with those with localized disease (7.08 ± 1.97, $p=0.001$). Female sex was significantly more prevalent in the multiple lesion group (81%) than in the localized group (46%) ($p=0.002$). Psychiatric comorbidities were also more common in the multiple lesion group (50% vs 26%, $p=0.037$). However, there were no statistically significant differences between groups in the individual rates of anxiety (19% vs 18%, $p=0.892$) or depression (35% vs 24%, $p=0.413$). A higher proportion of patients with multiple lesion LSC also reported other medical comorbidities (65% vs 44%), though this did not reach statistical significance ($p=0.093$).

Table III. Characterizing neurological, psychiatric, and medical comorbidities

Item	Total number reported	Frequency
Most common neurological conditions reported*		
Lumbar radiculopathy	5/45	11%
Lumbar spondylosis	4/45	9%
Cervical spondylosis	4/45	9%
Most common psychiatric conditions reported**		
Generalized anxiety disorder	16/32	50%
Major depressive disorder	14/32	44%
Anxiety	4/32	13%
Most common comorbidities reported***		
HTN	40/66	61%
Diabetes mellitus type 2	20/66	30%
Hyperlipidaemia	17/66	26%
Dyslipidaemia	10/66	15%
Chronic kidney disease	4/66	6%

*A total of 45 patients had at least 1 neurological condition. Among these, 44 different neurological conditions were documented. Here, we present the 5 most commonly reported. **A total of 32 patients had at least 1 psychiatric condition. Among these, 12 different psychiatric conditions were documented. Here, we present the 3 most commonly reported. ***A total of 66 patients had at least 1 comorbidity condition. Among these, 35 different comorbidities were documented. Here, we present the 5 most commonly reported.

DISCUSSION

Our study provides a comprehensive analysis of the clinical, demographic, and itch characteristics of a large

Table II. Incidence of selected variables by study population, ethnicity, sex, and body mass index

			Ethnicity			Sex			BMI				
Variables	Total ($n=125$) n (%)	p-value*	Hispanic ($n=37$)	Non-Hispanic ($n=87$)	p-value*	Female ($n=66$)	Male ($n=59$)	p-value*	Obese ($n=44$)	Over weight ($n=39$)	Normal ($n=34$)	Underweight ($n=1$)	p-value*
Itch location													
Limbs	84/125 (67)	**<0.0001**	23/37	61/87	0.91381	39/66	45/59	0.09072	25/44	31/39	24/34	0/1	0.13536
Genitalia	14/125 (11)		5/37	8/87		7/66	7/59		6/44	4/39	2/34	0/1	
Face/head/neck	11/125 (9)		3/37	8/87		9/66	2/59		6/44	1/39	4/34	0/1	
> 1 region	10/125(8)		4/37	6/87		6/66	4/59		5/44	1/39	3/34	1/1	
Trunk	3/125 (2)		1/37	2/87		3/66	0/59		2/44	1/39	0/34	0/1	
Generalized	2/125 (2)		1/37	1/87		2/66	0/59		0/44	1/39	0/34	0/1	
Not specified	1/125 (1)		0/37	1/87		0/66	1/59		0/44	0/39	1/34	0/1	
Bilateral vs unilateral													
Bilateral	62/110 (56)	0.23807	22/34	40/76	0.23807	33/55	29/55	0.44203	20/38	24/36	14/30	1/1	0.29743
Unilateral	48/110 (44)		12/34	36/76		22/55	26/55		18/38	12/36	16/30	0/1	
Itching duration													
<6 weeks	1/107 (1)	**<0.0001**	0/31	1/76	0.91809	0/57	1/51	0.133022	1/37	0/35	0/30	0	**0.00153**
>6 weeks	1/107 (1)		0/31	1/76		1/57	0/51		1/37	0/35	0/30	0	
6 weeks to 6 months	20/107 (16)		7/31	12/76		8/57	12/51		8/37	5/35	5/30	0	
6 months to 1 year	4/107 (4)		1/31	3/76		4/57	0/51		0/37	1/35	2/30	1/1	
1 to 10 years	71/107 (66)		20/31	51/76		40/57	31/51		20/37	26/35	22/30	0	
>10 years	11/107 (10)		3/31	8/76		4/57	7/51		7/37	3/35	1/30	0	
NRS scores on average													
0 to 5	21/96 (22)	**<0.0001**	7/27	13/68	0.46285	13/54	8/42	0.55468	6/31	7/33	7/27	0	0.94414
6 to 10	75/96 (78)		20/27	55/68		41/54	34/42		25/31	26/33	20/27	0	

*Statistical significant established at $p<0.05$; values in bold are significant. P-values for variables reflect overall comparisons across all listed subcategories within each variable (e.g., limbs, genitalia, trunk, etc. for location; and time-based intervals for duration) using χ^2 tests to assess differences by ethnicity, sex, and BMI.

cohort of LSC patients seen at a tertiary academic centre. A nuanced understanding of the clinical features of LSC is essential, particularly when caring for diverse patient populations. In addition to lichenified plaques from chronic scratching, patients – especially those with skin of colour – may present with pronounced pigmentary changes such as post-inflammatory hyperpigmentation or hypopigmentation, as well as exaggerated skin markings. These features are diagnostically important and may contribute to the psychosocial burden of disease (10).

LSC is a widespread condition, impacting about 12% of the general population, and is particularly prevalent among middle-aged individuals aged 30 to 50 years (16) likely due to a substantial rise in stress at this stage of life (16), and women, with a female to male ratio of 2:1 (16). Similarly, anogenital lichen simplex chronicus (AGLSC) commonly occurs in individuals between the ages of 30 and 50. Studies by Singh et al. (17) and O'Keefe et al. (18) reported mean ages of 49.9 and 42 years (ranging from 22 to 76 years), respectively, for patients with vulvar LSC. The majority of our patients, however, were over the age of 50 years, and no sex predominance was identified. The referral patterns and patient demographics at a tertiary care academic centre may contribute to this situation. Patients with AGLSC are often directed to OBGYN or urology rather than dermatology due to the specialized nature of these departments. Additionally, the university medical system tends to attract a higher concentration of older patients who have multiple diagnoses and complex, refractory cases. Chronic pruritus, such as that caused by lichen simplex chronicus, is particularly prevalent and troublesome among the geriatric population (3, 19). Many of these patients either seek out specialists themselves or are referred by their physicians for symptom management.

Table IV. Comparison between localized and multiple-lesion lichen simplex chronicus (LSC)

Variable	Localized LSC ($n = 99$)	Multiple-lesion LSC ($n = 26$)	p-value
Mean itch intensity	7.08 ± 1.97	7.81 ± 1.85	**0.001**
Female (%)	46%	81%	**0.002**
Psychiatric comorbidity (%)	26%	50%	**0.037**
Anxiety (%)	18%	19%	0.892
Depression (%)	24%	35%	0.413
Reported other medical comorbidities (%)	44%	65%	0.093

*Statistical significance established at $p < 0.05$; values in bold are significant.

Severe pruritus has been reported as the hallmark of LSC, affecting nearly all patients (16). Our study demonstrated that indeed itch was moderate to severe with an average NRS of 7 and many patients were able to control their scratching during the day but not at night. In addition, nearly 90% of patients in our study reported daily pruritus with approximately 50% of all patients experiencing itch during both day and night, and 14% reported only nighttime itch. Persistent itching, especially at night, aggravates the itch–scratch cycle and further intensifies pruritus, increasing the likelihood of chronic suffering (20). Given our findings and the detrimental effects of sleep deprivation on quality of life and overall health, it is crucial for clinicians to assess the impact of itch on sleep in older LSC patients.

Although our cohort did not show a significant difference in overall LSC prevalence between sexes, itch severity scores were similar across males and females. Both groups reported average itch NRS scores in the 6 to 10 range, with females having a mean score of 6.94 ± 1.88 and males a slightly higher mean of 7.12 ± 1.85. These findings contrast with other studies suggesting that women tend to experience more severe itch and greater emotional distress related to itch symptoms (21). Hormonal factors, such as oestrogen decline during menopause, may still play a role in itch perception during different life stages (22, 23).

Our findings showed that the most affected anatomical locations were the limbs, followed by the trunk and genitalia, which is consistent with prior studies on LSC demonstrating common LSC lesions on self-accessible areas such as the extremities, neck, and genitalia (10). Among patients with LSC of the extremities (84/125), 17% had involvement of the hands, which may be relevant for patients with exacerbating occupational exposures such as glove use, repeated friction, and chemical irritants. Contact allergens can contribute to the development or exacerbation of LSC, particularly in cases where chronic exposure to irritants or sensitizers perpetuates the itch–scratch cycle (24). In these cases, patch testing may help identify underlying allergic contact dermatitis in select patients, guiding more targeted management. It has also been reported that LSC is one of the most pleasurable pruritic dermatological conditions to scratch, and the most pleasurable areas to itch, such as the anogenital region, ankle, and upper back are associated with common LSC locations 25, 26).

To further characterize clinical heterogeneity in LSC, we compared patients with localized vs multiple-lesion disease. Those with multiple affected regions experienced significantly more severe itch and were disproportionately female. These patients were also more likely to report psychiatric comorbidities overall, although rates of specific conditions like anxiety and depression did not differ significantly between groups. While not statistically significant, there was also a trend toward a higher burden of medical comorbidities among patients with more widespread LSC. These findings suggest that multiple-lesion LSC may represent a clinically distinct subgroup with greater overall disease burden. Prior studies have similarly identified links between higher disease severity and increased psychological distress in LSC patients (9), supporting the need for more personalized management approaches in patients

with extensive disease.

Furthermore, a substantial portion of our cohort – 66% – were either overweight or obese.

Obesity is not a major factor in chronic itch except in psoriasis (27–29) and prurigo nodularis (PN) (30, 31). Recent studies have highlighted the role of obesity in exacerbating inflammatory pathways that can lead to increased itch severity for these patients. In psoriasis, the link between obesity and chronic itch is well documented. Obesity contributes to a pro-inflammatory state through the secretion of adipokines and cytokines, which can worsen psoriatic symptoms and reduce treatment efficacy (27, 29). Similarly, PN is associated with higher rates of obesity, which may intensify pruritic symptoms and is linked to systemic conditions like cardiovascular disease (31). Overall, the interplay between obesity and chronic itch in LSC, psoriasis, and PN highlights the importance of considering metabolic health in the management of these conditions. Addressing obesity through lifestyle modifications and targeted therapies could offer a dual benefit of improving skin symptoms and reducing associated comorbidities.

Consistent with the link between obesity and systemic disease, our cohort demonstrated a high burden of metabolic comorbidities, including hypertension (61%) and type 2 diabetes (30%). For comparison, the prevalence of hypertension and diagnosed type 2 diabetes in the general US adult population is approximately 45% (32) and 11%, respectively (33). These findings suggest that patients with LSC may represent a population with elevated cardiometabolic risk, which could further contribute to the chronicity and severity of their disease.

In our cohort of patients, the prevalence of psychiatric comorbidities such as anxiety and depression is notably high, reflecting a complex interaction between dermatological and psychological health. Generalized anxiety disorder and major depressive disorder were present in 50% and 44% of our cohort, respectively – substantially higher than national estimates of 3% for GAD (34) and 8% for MDD among US adults (35). A nationwide study by Liao et al. found that individuals with anxiety disorders have a 1.41-fold increased risk of developing LSC, emphasizing the role of psychological factors in the disease's onset and persistence (36). Additionally, Altunay et al. reported that LSC patients exhibit higher levels of stress, anxiety, and depression, with these psychological burdens potentially intensifying the itch–scratch cycle characteristic of LSC (9). Moreover, Martín-Brufau et al. identified specific personality traits in LSC patients, such as a tendency to prioritize others' needs and a pessimistic outlook, which may influence both the perception of itch and the psychological response to it (37). Such personality traits can be challenging to capture or assign a psychiatric diagnosis to, suggesting that the burden of psychopathology in LSC is likely underreported. These findings suggest a bidirectional relationship where psychological distress exacerbates pruritus severity, and the persistent itch–scratch cycle contributes to mental health deterioration. Therefore, addressing psychiatric comorbidities is crucial in the comprehensive management of LSC, as it may improve patient outcomes and reduce the disease's burden.

Although the pathogenesis of itch in LSC remains unclear, it is thought to involve in some cases a neuropathic component (38). Damage to nerve fibres can lead to hyperactivity, triggering the neuropathic mechanisms underlying chronic pruritus in LSC (38). Continuous scratching worsens this process by causing further epidermal denervation, leading to increased sensitization and susceptibility of skin to itching, thereby perpetuating the itch–scratch cycle (10). Reduced intraepidermal nerve fibre density has also been observed in LSC lesions (39). Our study identified several neurological comorbidities among LSC patients, including lumbar radiculopathy and spondylosis, which reinforce the idea that nerve fibre dysfunction may play a role in some cases of LSC. Hypertension and diabetes mellitus were also frequently reported in our cohort and are well known to contribute to small fibre neuropathy (40).

The elevated rates of hypertension, diabetes, anxiety, and depression in our cohort – compared with national averages – suggest potential shared mechanisms or bidirectional relationships with LSC. Chronic pruritus is known to exacerbate, and be worsened by, psychiatric comorbidities like anxiety and depression, creating a self-perpetuating cycle (41).

Although quality of life data were not collected in this study, future research should consider incorporating symptom-specific patient-reported outcome measures such as the ItchyQoL or Pruritus-VAS. Additionally, detailed medication histories, including the use of psychoactive drugs or other comedications, were not systematically extracted. Subsequent research should consider evaluating the role of polypharmacy and specific drug classes in modulating itch and associated comorbidities.

Our study's limitations include its retrospective design, which may introduce recall bias and lack of control over initial data collection. The cohort predominantly consists of older individuals, potentially skewing the representation of LSC demographics. Additionally, while associations between LSC and comorbidities are explored, causal relationships are not established. Our study focused on patients with LSC who did not have a documented history of eczema to investigate LSC-specific comorbidities beyond atopy. While atopy, including asthma and allergic rhinitis, has been reported in LSC populations, this study did not specifically analyse these associations. Future studies should prospectively evaluate the broader atopic background in LSC patients to clarify its potential influence on disease pathophysiology and management.

In conclusion, our findings highlight the debilitating nature of pruritus in LSC and its associations with age,

gender, sleep disturbances, psychological state, nerve dysfunction, and BMI. This multifaceted condition significantly impacts patients' quality of life, underscoring the importance of early recognition and targeted interventions for psychiatric, neurological, and metabolic comorbidities to alleviate pruritus in LSC and enhance patient outcomes. Longitudinal studies examining the impact of integrated management approaches, including psychological support and targeted therapies, could provide further insights into improving the quality of life for patients with LSC. Additionally, exploring the role of hormonal influences on pruritus perception, particularly in women, may offer new avenues for personalized treatment options.

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