Lamotrigine Treatment of Pathologic Skin Picking: An Open-Label Study

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Background: Although pathologic skin picking is a relatively common behavior, treatment data are limited. We hypothesized that lamotrigine would reduce the symptoms of pathologic skin picking.

Method: 24 subjects (19 women [79.2%]; mean ± SD age = 34.1 ± 12.2 years) with pathologic skin picking (based on DSM-IV criteria for other impulse control disorders) were treated in a 12-week open-label trial of lamotrigine as monotherapy. Lamotrigine dosing ranged from 25 mg every other day to 300 mg/day. The primary outcome measure was time per day spent picking. Subjects were also assessed with measures examining the symptoms of pathologic skin picking and psychosocial functioning. Data were collected from January 15, 2006, to September 18, 2006.

Results: Mean (SD) time per day spent picking decreased from 118.1 (130.0) to 59.9 (115.2) minutes ($p < .001$). Sixteen subjects (66.7%) were considered either "very much improved" or "much improved" in terms of skin picking symptoms. Seven subjects (29.2%) reported no picking at study endpoint. Significant improvement was seen on scales assessing the symptoms of pathologic skin picking ($p = .001$) and social functioning ($p = .002$). Mean time to response (i.e., when the subject was much or very much improved) was 8 weeks, which corresponded to a lamotrigine dose of 200 mg/day.

Conclusions: Lamotrigine was associated with improvements in two thirds of subjects with pathologic skin picking. Placebo-controlled, double-blind studies are needed to evaluate further the safety, tolerability, and efficacy of lamotrigine in the treatment of this problematic behavior.

Trial Registration: ClinicalTrials.gov identifier NCT00269594 (http://www.clinicaltrials.gov).

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Pathologic skin picking (also known as neurotic excoriation, compulsive skin picking, psychogenic excoriation, and dermatotillomania) involves repetitive, ritualistic, or impulsive picking of otherwise normal skin leading to tissue damage, personal distress, and impaired functioning.[1] Although pathologic skin picking has been described in the medical literature for over 100 years, it remains poorly understood and often goes undiagnosed and untreated.[2–3] Although some skin picking appears normal and quite common, pathology exists in the duration and extent of the behavior, as well as in the reasons for picking, associated emotions, and resulting problems. Individuals with pathologic skin picking report thoughts of picking or impulses to pick that are irresistible, intrusive, and/or senseless.[1] These thoughts, impulses, or behaviors also cause marked distress and significantly interfere with other activities.[4]

The prevalence of pathologic skin picking in the general population is unknown. Studies suggest that 2% of dermatology patients and 4% of college students show evidence of pathologic skin picking.[1,5] Among clinical samples, research has found that 11.8% of adolescents hospitalized in a psychiatric facility suffered from pathologic skin picking.[6] The majority of individuals seeking treatment for pathologic skin picking are female.[7] People who engage in this behavior typically spend a significant amount of time picking. Most often they pick their face, but any body part may be the focus—for example, torso, arms, hands, or legs. Although individual episodes of picking may only last a few minutes, many individuals have multiple episodes of picking each day. The picking often leads to infections, significant scarring, shame, and social avoidance.

Treatment research for pathologic skin picking is sparse. A number of medications have been used to treat this behavior in case reports (olanzapine, pimozide, naltrexone, clomipramine, doxepin, paroxetine, sertraline,

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aripiprazole, and venlafaxine).[1,8] Selective serotonin reuptake inhibitors (fluoxetine[9] and fluvoxamine[10]) have shown some promise in 2 open-label studies. A 10-week, double-blind study of fluoxetine in 20 subjects, however, found that the medication was significantly more beneficial than placebo on only 1 of 3 measures used to rate improvement (a self-report visual analog scale assessing change in skin-picking behavior).[11] The fluoxetine study's inability to find significant benefit on all outcome measures, however, may have been due to type II error and limited statistical power given the small sample size. No other pharmacologic studies of this problematic behavior have been conducted.

Because data on pathologic skin picking's treatment response to pharmacotherapy are limited, the goal of the proposed study was to evaluate the efficacy and safety of lamotrigine in pathologic skin picking. This study focused on pathologic skin picking that was not due to substance use (e.g., cocaine or amphetamines), medical disorders (e.g., dermatologic or renal conditions), or other psychiatric disorders (e.g., body dysmorphic disorder, obsessive-compulsive disorder, or delusions of parasitosis). The rationale for the use of lamotrigine was 2-fold: first, glutamatergic dysfunction has been implicated in the pathophysiology of obsessive-compulsive disorder,[12,13] a disorder with some phenomenological and possibly neurobiological links to pathologic skin picking; and second, clinical reports support the possible efficacy of glutamatergic modulators in the treatment of repetitive or compulsive disorders.[14,15] Because glutamate may play a role in repetitive addictive behaviors, lamotrigine's potential to affect glutamate[16,17] may prove efficacious in treating this behavior. The hypothesis was that lamotrigine would be effective and well tolerated in individuals with pathologic skin picking. The current study may provide needed data on the treatment of a disabling behavior that currently lacks a clearly effective treatment.

METHOD

Subjects

Men and women aged 18 to 65 with a primary diagnosis of pathologic skin picking were recruited by newspaper advertisements for medication treatment. The diagnostic criteria for pathologic skin picking, based on DSM-IV criteria for other impulse control disorders, has been previously reported[1] and include the following: (1) recurrent picking at or otherwise manipulating the skin that results in noticeable damage to the skin; (2) an increasing sense of tension, or an unpleasant emotional or physical state, immediately before picking the skin or when trying to resist picking; (3) pleasure, gratification, or relief at the time of picking; (4) the disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of function; (5) the skin picking is not due to a substance (e.g., cocaine or amphetamine) or a general medical condition (e.g., eczema, psoriasis, diabetes, liver or kidney disease, Hodgkin's disease, polycythemia vera, or systemic lupus); and (6) the skin picking is not better accounted for by another mental disorder (e.g., body dysmorphic disorder, obsessive-compulsive disorder, delusional disorder, or substance use disorder). Individuals who primarily picked to improve imagined defects in appearance (consistent with body dysmorphic disorder) or to remove germ contamination (consistent with obsessive-compulsive disorder) were excluded.

All subjects were required to have picked their skin during the week prior to enrollment and to have picked on average at least once per week for the past 3 months. Women's participation required negative results on a β-human chorionic gonadotropin pregnancy test and stable use of a medically accepted form of contraception.

Exclusion criteria included (1) unstable medical illness or clinically significant abnormalities on laboratory tests or physical examination at screening; (2) history of seizures; (3) myocardial infarction within 6 months; (4) current pregnancy or lactation, or inadequate contraception in women of childbearing potential; (5) a need for medication other than lamotrigine with possible psychotropic effects; (6) any thoughts of suicide; (7) current Axis I disorder determined by the Structured Clinical Interview for DSM-IV (SCID)[18] and by SCID-compatible modules for impulse control disorders[19]; (8) lifetime history of bipolar disorder type I or II, dementia, schizophrenia, or any psychotic disorder determined by SCID; (9) current or recent (past 3 months) DSM-IV substance abuse or dependence; (10) positive urine drug screen at screening; (11) initiation of psychotherapy or behavior therapy within 3 months prior to study baseline; (12) previous treatment with lamotrigine; (13) treatment with investigational medication or depot neuroleptics within 3 months, with fluoxetine within 6 weeks, or with other psychotropics within 2 weeks prior to study baseline; and (14) current treatment with an antiepileptic medication.

The institutional review board for the University of Minnesota approved the study and the informed consent. One investigator discussed potential risks of the study, as well as alternative treatments, with subjects. After complete description of the study, subjects provided written informed consent. This study was carried out in accordance with the Declaration of Helsinki. Data were collected from January 15, 2006, to September 18, 2006.

Study Design

The study consisted of twelve weeks of open-label lamotrigine. After completing all screening evaluations (week 0), subjects began lamotrigine at 25 mg every other day for 1 week. At week 1, the dose was raised to

25 mg/day. At week 2, the dose was raised to 50 mg/day for 2 weeks. Thereafter, all visits were scheduled every 2 weeks at which times the dose could be increased to 100 mg/day, then 200 mg/day, and finally 300 mg/day unless clinical improvement was attained at a lower dose (clinical improvement was assessed by the investigator with respect to skin picking behavior, thoughts, and urges). If clinically necessary (e.g., because of side effects or an adequate response to a lower dose), the dose was raised more slowly or the target dose of 300 mg/day was not reached. Subjects could not take other psychotropic medications during the study, and psychotherapy of any form (including cognitive-behavioral therapy) was not allowed during the study. Subjects who were not compliant with their use of study medication (i.e., failing to take medication for 3 or more consecutive days) were discontinued from the study.

Baseline Assessments

Subjects were evaluated at entry into the study by the SCID[18] and SCID-compatible modules for impulse control disorders (reliability data are not available for these modules).[19] Medical history, physical examination, and routine laboratory testing were performed. Time spent picking each day for the past week was assessed at study entry. In addition, skin picking symptoms were assessed using the clinician-administered Yale Brown Obsessive Compulsive Scale Modified for Neurotic Excoriation (NE-YBOCS).[10] Subjects reported severity of skin picking using the self-rated Skin Picking Symptom Assessment Scale (SP-SAS) (available from the authors upon request). Anxiety symptoms were rated with the Hamilton Rating Scale for Anxiety.[20] Depressive symptoms were assessed using the Hamilton Rating Scale for Depression.[21] Psychosocial functioning was evaluated using the self-report version of the Sheehan Disability Scale.[22]

Efficacy Assessments

Subjects were seen weekly for 2 weeks, every 2 weeks for the next 6 weeks, and then 1 final visit after the last 4 weeks of the 12-week open-label study. The primary outcome measure was the mean time spent picking per day for the previous week. Because it is difficult for subjects to accurately estimate time spent on picking behavior, each subject was asked to keep a diary of time spent picking each day. This was chosen as the primary outcome measure due to its clinical relevance. Because thoughts and urges to pick may vary greatly among subjects, we chose to use time spent picking as the main outcome measure as it is the 1 symptom consistently reported by subjects and the one that subjects generally reported as the most distressing. Test-retest reliability data from this study demonstrated a Spearman correlation of 0.646 ($p = .001$) for time spent picking.

Secondary measures that were used at each study visit included:

The Yale Brown Obsessive Compulsive Scale Modified for Neurotic Excoriation. The NE-YBOCS[10] is a modification of the Yale Brown Obsessive Compulsive Scale, a reliable and valid, clinician-administered scale for obsessive-compulsive disorder. This modified measure is a 10-item scale that rates picking symptoms during the last 7 days on a severity scale from 0 to 4 for each item (total scores range from 0 to 40 with higher scores reflecting greater illness severity). The first 5 items of the NE-YBOCS comprise the picking urge/thought subscale (time occupied with urges/thoughts, interference and distress due to urges/thoughts, and resistance against and control over urges/thoughts), and items 6 through 10 comprise the picking behavior subscale (time spent picking, interference and distress due to picking, and ability to resist and control picking behavior). This modification of the YBOCS has previously been used in a treatment study of pathologic skin picking and has shown satisfactory psychometric properties.[9,10] In the current study, the NE-YBOCS demonstrated satisfactory test-retest reliability (Spearman correlation = 0.826, $p < .001$), satisfactory correlation with the Clinical Global Impressions scale (CGI) at baseline (Spearman correlation = 0.806, $p < .001$), and satisfactory correlation with CGI change over time (when compared from baseline to last visit) (Spearman ρ correlation = 0.898, $p < .001$).

Skin Picking Symptom Assessment Scale. The SP-SAS is a modification of a reliable and valid self-report scale used for other impulse control disorders such as pathologic gambling[23] and kleptomania.[24] Subjects completed the SP-SAS at each study visit. The SP-SAS is a 12-item, reliable and valid, self-rated scale assessing picking urges, thoughts, and behaviors during the previous 7 days. Each item is rated 0 to 4 with a possible total score of 48. Higher scores reflect greater severity of skin picking symptoms. In this study, the SP-SAS demonstrated satisfactory test-retest reliability (Spearman correlation = 0.736, $p < .001$), satisfactory correlation with CGI at baseline (Spearman correlation = 0.636, $p = .001$), and satisfactory change over time when compared to CGI change (Spearman ρ correlation = 0.761, $p < .001$).

Clinical Global Impressions. The CGI[25] consists of 2 reliable and valid 7-item Likert scales, CGI-Severity of Illness scale and CGI-Improvement scale, used to assess severity and change in clinical symptoms, respectively. The CGI-Improvement scale was used every visit after the screening visit. The scale ranges from 1 = "very much improved" to 7 = "very much worse." The CGI-Improvement scale was rated by the clinician at each visit. The CGI-Severity of Illness scale was used at each visit and ranges from 1 = "not ill at all" to 7 = "among the most extremely ill." The CGI-Improvement scale was used to rate only changes in symptoms of skin picking.

Hamilton Rating Scale for Anxiety. The Hamilton Rating Scale for Anxiety[20] is a reliable and valid, clinician-administered, 14-item scale that provides an overall measure of global anxiety.

Hamilton Rating Scale for Depression. The Hamilton Rating Scale for Depression[21] is a valid and reliable, 17-item, clinician-administered rating scale assessing severity of depressive symptoms.

Sheehan Disability Scale. The Sheehan Disability Scale[22] is a 3-item, reliable and valid, self-report scale that assesses functioning in 3 areas of life: work, social or leisure activities, and home and family life.

Perceived Stress Scale. The 10-item Perceived Stress Scale[26] is a reliable and valid, self-report measure designed to assess the degree to which individuals find their lives to be unpredictable, uncontrollable, and stressful. Each question is answered on a 5-point scale (ranging from "never" to "very often") on the basis of experiences of the previous month. Scores range from 0 to 40.

Quality of Life Inventory. The Quality of Life Inventory[27] is a 16-item, self-administered rating scale that assesses life domains such as health, work, recreation, friendships, love relationships, home, self-esteem, and standard of living. Each item is rated according to importance in the respondent's life and according to the level of satisfaction perceived by the respondent in that area of life. Each item generates a weighted satisfaction score on the basis of the importance and satisfaction ratings, and the total Quality of Life Inventory score is the mean of all weighted satisfaction ratings that have nonzero importance. Raw scores range from –6 to +6, with high quality of life corresponding to a score of 3.6 to 6.0, average quality of life in the range of 1.6 to 3.5, low quality of life in the range of 0.9 to 1.5, and very low quality of life corresponding to a score of –6.0 to 0.8. The Quality of Life Inventory has demonstrated excellent reliability and validity in nationwide normative studies[27] and in studies of other impulse control disorders.[28]

Safety Assessments

Safety assessments at each visit included evaluations of sitting blood pressure, heart rate, and weight. Adverse effects were documented and included time of onset and resolution, severity, action taken, and outcome. The investigator recorded use of concomitant medications in terms of daily dosage, start and stop dates, and reason for use. Laboratory assessments (e.g., clinical chemistry, hematology, and urine toxicology) and urine pregnancy tests were performed only at screening. Compliance was monitored by pill count.

Data Analysis

The primary efficacy measure was mean time spent picking per day. Primary analysis used an intent-to-treat population with last observation carried forward. Baseline and subsequent scores were compared with paired t tests, 2-tailed. In cases of a large disparity between the mean and median, we used the Wilcoxon signed rank test (z statistic), 2-tailed. Responders (defined as "very much or much improved" on the CGI-Improvement scale) and nonresponders were compared using Fisher exact test, t test, and Mann-Whitney U test to examine which variables were associated with treatment response. Because we performed multiple comparisons, we used an adjusted α level of $p < .01$; we did not adjust the α level to reflect all statistical comparisons because this is the first study of this topic and is therefore exploratory; in addition, the Bonferroni correction tends to be overly conservative.[29]

RESULTS

Twenty-four subjects (mean ± SD age = 34.1 ± 12.2 years [range, 18–58]; 19 women [79.2%]) with a current diagnosis of pathologic skin picking were enrolled. Demographics and clinical characteristics of the intent-to-treat sample are presented in Table 1. Mean ± SD age at onset of skin picking was 15.3 ± 13.8 years (range, 3–37). Twenty subjects (83.3%) reported picking at more than 1 body part, and 11 (45.8%) picked at more than 2 body parts. Thirteen subjects (54.2%) reported picking primarily at the feet or hand, 11 (45.8%) at the face or head, 11 (45.8%) at the arms or legs, and 5 (20.8%) at their torsos. Sixteen (66.7%) were aware of beginning their picking behavior at least 50% of the time, whereas 8 (33.3%) were aware of picking less than 50% of the time and therefore were picking "automatically" most of the time. Ten (41.7%) reported having at least 1 first-degree relative with either pathologic skin picking or trichotillomania.

Of the 24 subjects, 20 (83.3%) completed the 12-week open-label study. One subject was discontinued due to rash after 2 weeks of treatment (taking 50 mg/day); 1 subject dropped out after 8 weeks (taking 200 mg/day) and 1 after 10 weeks (taking 300 mg/day), both reporting frustration with lack of improvement; and 1 discontinued the study due to transportation difficulties after 4 weeks (taking 100 mg/day).

For all enrolled subjects, daily time spent picking decreased from a mean (SD) of 118.1 (130.0) (range, 30–480) minutes per day at baseline to 59.9 (115.2) (range, 0–480) at endpoint ($z = –3.617$; $p < .001$) (Table 2). Seven subjects (29.2%) reported no picking at study endpoint. Of the 24 subjects, 16 (66.7%) were responders (defined a priori as either "much improved" or "very much improved" on the basis of CGI scores) at study endpoint. On the basis of CGI-Improvement scale scores, 9 of the 24 subjects (37.5%) were "very much improved" and 7 (29.2%) were "much improved" by study endpoint. The majority (13/16, 81.3%) of those subjects who responded to treatment (i.e., were "much improved" or

Table 1. Demographic and Clinical Characteristics of Individuals With Pathologic Skin Picking

Characteristic	Pathologic Skin Picking Subjects (N = 24)
Age, mean (SD) [range], y	34.1 (12.2) [18–58]
Sex, female, N (%)	19 (79.2)
Race/Ethnicity, N (%)	
White	21 (87.5)
Asian American	2 (8.3)
African American	1 (4.2)
Marital status, N (%)	
Single	11 (45.8)
Married	12 (50.0)
Widow/separated/divorced	1 (4.2)
Education, N (%)	
High school graduate or less	3 (12.5)
Some college	5 (20.8)
College graduate	12 (50.0)
Postcollege education	4 (16.7)
Age at onset of pathologic skin picking, mean (SD) [range], y	15.3 (13.8) [3–37]
Duration of pathologic skin picking prior to seeking treatment, mean (SD) [range], y	18.9 (11.8) [3–45]
Previously sought treatment for pathologic skin picking, N (%)	4 (16.7)
Unemployed/disabled due to pathologic skin picking, N (%)	1 (4.2)
History of needing antibiotic treatment for pathologic skin picking, N (%)	5 (20.8)
Picks at other people's skin, N (%)	3 (12.5)
Subjects with at least 1 family member with these disorders, N (%)	
Pathologic skin picking	9 (37.5)
Obsessive-compulsive disorder	3 (12.5)
Trichotillomania	1 (4.2)
Comorbid lifetime disorders, N (%)[a]	
Major depressive disorder	3 (12.5)
Dysthymia	0 (0)
Social phobia	0 (0)
Generalized anxiety disorder	1 (4.2)
Panic disorder	0 (0)
Agoraphobia	0 (0)
Posttraumatic stress disorder	0 (0)
Obsessive-compulsive disorder	3 (12.5)
Any eating disorder	0 (0)
Alcohol abuse/dependence	0 (0)
Drug abuse/dependence	0 (0)
Nicotine dependence	2 (8.3)
Trichotillomania	7 (29.2)
Body dysmorphic disorder	1 (4.2)
Attention-deficit/hyperactivity disorder	1 (4.2)
Compulsive internet use	1 (4.2)

[a]Comorbid lifetime disorders include disorders for which the subject met criteria in his or her lifetime but not in the past 12 months.

"very much improved" by CGI) did so by week 8 (mean ± SD time to response was 8.4 ± 2.2 weeks), which corresponded to a lamotrigine dose of 200 mg/day for 2 weeks.

There were statistical trends for those subjects who responded to lamotrigine to have a shorter duration of illness (mean ± SD = 15.1 ± 9.5 years compared to 25.4 ± 10.3 years, t = –2.366, df = 21.4, p = .027) and a slightly less severe form of illness (mean ± SD NE-YBOCS total score of 17.9 ± 5.3 compared to 22.6 ± 7.1, t = –1.831, df = 22, p = .081). No other baseline variables (gender, age, age at onset, time spent picking, social functioning, or perceived stress) were associated with responding to lamotrigine.

Secondary measures of skin picking symptoms also showed improvement between baseline and endpoint in the intent-to-treat population (Table 2). Mean scores on the NE-YBOCS urge and behavioral subscales, as well as the self-report SP-SAS, all demonstrated significant reductions at endpoint (Table 2). The NE-YBOCS urge demonstrated a 42.9% reduction, and the NE-YBOCS behavior subscale demonstrated a 42.4% reduction by study endpoint. The SP-SAS demonstrated a 34.4% reduction in self-reported skin picking symptoms.

Level of functioning improved between baseline and endpoint as indicated by a 45.2% reduction in mean scores on the Sheehan Disability Scale scale, and there was a statistical trend of improvement seen on the Perceived Stress Scale (Table 2). Overall quality of life, however, was essentially unchanged during the course of the study (Table 2). Nine of the 24 subjects (37.5%) reported either "low" or "very low" quality of life at baseline, and 8 (33.3%) continued with "low" or "very low" quality of life at study endpoint.

Adverse events (defined as any change in physical symptoms) were few. One subject experienced a rash, which resolved without sequelae after discontinuing medication. Five subjects reported mild episodic headaches when taking 50 mg/day, and 1 reported mild headaches when taking 100 mg/day. All headaches resolved without sequelae. One subject reported diarrhea when the dose was increased to 50 mg/day and this resolved without sequelae. No other adverse events were reported.

DISCUSSION

This pilot study, the first to examine the efficacy of a possible glutamatergic agent[16,17] in individuals with pathologic skin picking, found that skin picking symptoms improved in a majority of subjects. The efficacy of lamotrigine lends support to the hypothesis that possible pharmacologic manipulation of the glutamate system[30] may target core symptoms of pathologic skin picking. Glutamatergic agents have shown early promise in treating other compulsive repetitive behaviors, such as obsessive-compulsive disorder.[14,15] Lamotrigine is thought to act via inactivation of voltage-sensitive Na^+ and possibly Ca^{2+} channels, leading to suppression of abnormally increased neuronal firing and thus inhibiting excessive release of glutamate.[31,32] Further work defining the precise manner in which lamotrigine mediates its beneficial effects could enhance treatment strategies for pathologic skin picking and other impulse control disorders, such as trichotillomania.

Improvement in this study appears to have extended beyond the time spent picking to also include overall

Table 2. Change in Study Measures in 24 Subjects With Pathologic Skin Picking Treated With Lamotrigine

Measure	Baseline	Week 12 (endpoint)[a]	Test Statistic[b]	df	p Value
Total time per day picking, mean (SD) [range], min	118.1 (130.0) [30–480]	59.9 (115.2) [0–480]	z = –3.617	NA	< .001
CGI-Improvement scale, N (%)					
Very much improved	NA	9 (37.5)	NA	NA	NA
Much improved	NA	7 (29.2)	NA	NA	NA
CGI-Severity of Illness scale score, mean (SD)[c]	4.96 (0.94)	3.12 (1.69)	t = 4.760	23	< .001
NE-YBOCS total score, mean (SD)	19.5 (6.21)	11.2 (9.69)	z = –3.493	NA	< .001
NE-YBOCS urge/thought subscale score, mean (SD)	7.67 (4.33)	4.33 (4.89)	t = –3.623	23	.001
NE-YBOCS behavior subscale score, mean (SD)	11.8 (2.73)	6.83 (5.12)	z = –3.656	NA	< .001
SP-SAS total score, mean (SD)	29.3 (6.93)	19.2 (12.2)	z = –3.363	NA	.001
Hamilton Rating Scale for Depression score, mean (SD)	2.12 (2.36)	1.96 (2.69)	t = 0.228	23	.821
Hamilton Rating Scale for Anxiety score, mean (SD)	2.04 (1.83)	1.96 (2.53)	t = 0.131	23	.896
Sheehan Disability Scale score, mean (SD)	11.5 (6.49)	6.25 (8.23)	z = –3.150	NA	.002
Perceived Stress Scale score, mean (SD)	11.2 (8.00)	15.0 (6.84)	t = –2.094	23	.047
Quality of Life Inventory, mean raw score (SD)	43.2 (15.2)	46.1 (15.1)	z = 1.514	NA	.130

[a]Intent-to-treat with last observation carried forward.
[b]Statistic: z = Wilcoxon signed rank test (z statistic), t = paired t test.
[c]CGI-Severity of Illness scale: a score of 1 = not ill at all, 2 = borderline mentally ill, 3 = mildly ill, 4 = moderately ill, 5 = markedly ill, 6 = extremely ill, and 7 = among the most extremely ill.
Abbreviations: CGI = Clinical Global Impressions, NA = not applicable, NE-YBOCS = Yale Brown Obsessive Compulsive Scale Modified for Neurotic Excoriation, SP-SAS = Skin Picking Symptom Assessment Scale.

functioning in these individuals. This is the first study to examine how pharmacologic treatment affects functioning in individuals with pathologic skin picking. The findings from the Sheehan Disability Scale suggest that functional domains also appear to improve with effective treatment, even during the short-term. Controlled studies are warranted to investigate the extent to which improvement in functional domains in individuals with pathologic skin picking is specifically associated with lamotrigine treatment.

In addition to time spent picking, mean scores on the NE-YBOCS (which reflects urges and thoughts about picking as well as behavior) significantly decreased over the course of the study. This finding has potential clinical significance as picking may be controlled for a period of time, but the individual is still preoccupied with urges to pick that are intrusive and distressing.[33] Although *automatic picking* (without conscious awareness) accounted for a minority of these subjects' picking behavior, most subjects in this study reported a mix of automatic and urge-driven picking. As the urges were reduced throughout the course of this study, the picking behavior also improved, but subjects would report that some of the automatic picking remained. The reason that only a minority of subjects (29.2%) were completely asymptomatic may be due to lamotrigine's ability to reduce urges to pick but its inability to affect the neurocircuitry that underlies more automatic or habitual behaviors. Research is needed to understand how pharmacologic treatment may benefit certain subtypes of individuals with pathologic skin picking, such as those with urges to pick compared to those who pick automatically or without conscious awareness.

Additionally, those with automatic picking appeared to have milder symptoms as reflected in lower NE-YBOCS scores. This finding not only raises concerns about whether different measures need to be used to assess individuals who pick automatically compared to those who pick due to urges (i.e., the NE-YBOCS urge subscale registers low scores on automatic pickers), but also whether pharmacologic treatment is even warranted for individuals who pick automatically. Perhaps habit reversal, a more benign treatment, should be considered for those who pick without conscious awareness. Pharmacotherapy could therefore be useful in those who pick due to strong urges. Because many individuals with pathologic skin picking have a combination of automatic and urge-driven picking, clinicians may consider starting with behavioral therapy and use pharmacologic interventions only as needed.

Trials of serotonin reuptake inhibitors in the treatment of pathologic skin picking have shown some promise in open-label trials, but the results have been less convincing in double-blind designed studies.[9–11] Although encouraging open-label findings have often been followed by less conclusive results of placebo-controlled, double-blinded studies, it is encouraging that many subjects (66.7%) were "much or very much improved" on the CGI. Given the open-label design of the study, however, the interpretation of the efficacy results of this study is limited. Lamotrigine was generally well tolerated. Only 1 subject dropped out of the study due to side effects (rash), and even she had no subjectively negative response to the medication.

This pilot study represents only the third pharmacologic agent studied for pathologic skin picking, and the only one to examine a non-SSRI medication. There exist, however, several limitations. First, the primary endpoint for this study was time spent picking, a problematic self-report measure due to subjects' difficulties estimating

time. Although a clinician-assessed measure may have been more objective, time spent picking (because skin picking can lead to damaged skin and avoidance of social situations) arguably appears to be the most important clinical aspect of this behavior. Second, pathologic skin picking in many individuals appears to be a chronic disease that will require long-term therapy. By design, this study did not assess treatment effects beyond the short-term 12-week treatment period, and longer-term effects thus require further evaluation. It is possible that a longer course of therapy could result in continued and even greater reductions in skin picking symptoms, or that symptom improvement may diminish over time. Third, the study enrolled subjects seeking pharmacologic treatment, not psychotherapy. These results, therefore, may not generalize completely to the larger population of people with pathologic skin picking. Fourth, this study did not include behavioral therapy. Effective behavioral treatments (e.g., habit reversal and acceptance and commitment therapy) for pathologic skin picking are emerging[34,35] and should be considered in conjunction with pharmacotherapies. Fifth, the study was open-label in design. Larger, double-blind, placebo-controlled studies of longer duration are required to investigate further the efficacy, safety, and tolerability of lamotrigine in the treatment of pathologic skin picking.

Pathologic skin picking is a heterogeneous behavior, and clinicians must carefully screen for a number of medical conditions, obsessive-compulsive disorder, body dysmorphic disorder, and delusions of parasitosis, as treatment may need to target the underlying disorder in those cases. When no other underlying cause for the picking is found, and when the symptoms appear severe enough to warrant pharmacologic treatment, lamotrigine may be beneficial. Although lamotrigine is not FDA approved for the treatment of pathologic skin picking, this investigation suggests that lamotrigine may be effective in the short-term treatment of pathologic skin picking. As safe and effective treatments for pathologic skin picking emerge, it becomes increasingly important that generalist physicians and mental health care providers screen for this behavior in order to provide timely treatment.

Drug names: aripiprazole (Abilify), clomipramine (Anafranil and others), doxepin (Sinequan and others), fluoxetine (Prozac and others), lamotrigine (Lamictal and others), naltrexone (Vivitrol, ReVia, and others), olanzapine (Zyprexa), paroxetine (Paxil, Pexeva, and others), pimozide (Orap), sertraline (Zoloft and others), venlafaxine (Effexor and others).

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