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Assessment of the quality of life (QoL) of patients with dermatitis and the impact of patch testing on QoL: A study of 519 patients diagnosed with dermatitis

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Abstract

Background: Dermatitis can impair the quality of life (QoL) of patients. Knowledge of the QoL-associated factors and the impact of patch testing on QoL is limited.

Objectives: To identify demographic and clinical factors affecting QoL, and to measure the impact of patch testing on QoL of dermatitis patients.

Methods: The data and Dermatology Life Quality Index (DLQI) questionnaires of 519 dermatitis patients were analyzed. Of these, 107 underwent patch testing and completed the questionnaires two times (once before testing and again 60 days afterward).

Results: The overall mean ($\pm$ standard deviation) DLQI was 9.5 ($\pm$ 6.4). Patients aged 20 to 59 years and those who had more frequent disease exacerbations demonstrated significantly higher DLQIs. For each DLQI question, being female and aged 20 to 59 years were associated with impairments of various aspects of life, whereas the anatomical site of dermatitis impacted each question differently. The DLQI scores of the patients undergoing patch testing decreased significantly, irrespective of whether the test results were positive or negative.

Conclusions: Being of a working age and having more frequent disease exacerbations had negative QoL impacts. In addition, patch testing improved almost every aspect of the DLQI.

KEYWORDS

allergic contact dermatitis, Dermatology Life Quality Index, eczema, facial dermatitis, generalized dermatitis, global assessment, hand dermatitis, patch test, quality of life

1 | INTRODUCTION

Dermatitis itself is not a life-threatening disease. Nevertheless, it causes itching and embarrassment, and it may become a chronically

relapsing disease that can affect a patient's work, psychological state, socioeconomic status, and quality of life (QoL).¹ Patients with dermatitis on different parts of their body have reported that they have social and functional difficulties in life.^{2,3} In hand dermatitis patients,

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the difficulties are often work-related and might ultimately result in sick leave, occupational change, or even permanent disability.⁴ Patients with facial dermatitis suffer greater psychological stress because of the unpleasant appearance of a body part that is hard to cover.⁵

The Dermatology Life Quality Index (DLQI) is a standard questionnaire that measures the impact and effect of various skin disorders.⁶ The DLQI scores of dermatitis patients can be influenced by multiple factors, such as disease severity,^{5,7,8} frequency of disease exacerbation,³ sex, and age group.⁵

As with any other disease, the management of dermatitis patients should be holistic and encompass the physical, mental, and environmental aspects. To our knowledge, there are still limited detailed data relating to the effects of patch testing on dermatitis patients' QoL. Thus, our study aimed to identify both demographic and disease factors that might influence QoL, and to measure the impact of patch testing on the daily QoL of dermatitis patients.

2 | METHODS

2.1 | Patients

This prospective study was approved by the Ethics Committee of the Siriraj Institutional Review Board (Si507/2014). A total of 519 patients diagnosed with dermatitis and aged 18 years or older were recruited from the Outpatients Department of the Dermatology Clinic, Siriraj Hospital, over a 1-year period. Demographic data were collected. The diagnoses were made by dermatologists based on the patients' clinical presentations. In this study, the term "dermatitis" was used to describe a group of inflammatory skin conditions in patients that mainly presented with eczematous lesions, so that patch testing should be considered.⁹ These included a variety of diagnoses such as suspected contact dermatitis, atopic dermatitis, seborrheic dermatitis, stasis dermatitis, or discoid (nummular) eczema.⁹ Patients who were suspected of having allergic contact dermatitis were asked to be referred for patch testing in accordance with the European Society of Contact Dermatitis guidelines.⁹ Of all, 107 dermatitis patients were patch tested, whereas others could not participate due to individual patient's conditions including financial status, limited sick leave days, travel difficulties, unwillingness, or unavailable to be tested. A history of atopy was defined as having had at least one atopic disease (atopic eczema, asthma, and/or hay fever).

2.2 | Quality of life and physician and patient global assessments

QoL was evaluated using the DLQI.^{6,10} This questionnaire consists of 10 questions (Q) that evaluate six aspects of QoL: symptoms and feelings, daily activities, leisure, work and school, personal relationships, and treatment during the preceding 7 days. Q1 evaluates itch, Q2 corresponds to embarrassment, Q3 assesses shopping/home/gardening

problems, Q4 deals with clothing choices, Q5 evaluates social/leisure activities, Q6 is concerned with sport, Q7 assesses work/study limitations, Q8 focuses on partner/close friends/relatives, Q9 deals with sexual difficulties, and Q10 addresses problems caused by treatment. Each question scores from 0 to 3; a higher score indicates a worsened QoL. The total score ranges from 0 to 30. To assist with the identification of the factors associated with the QoL, the patients in the present study were categorized into two DLQI groups^{11,12}: a low-DLQI group, with total DLQI scores between 0 and 10; and a high-DLQI group, with total DLQI scores between 11 and 30.

All 519 patients answered the DLQI questionnaire once during their first visit. However, the subgroup of 107 dermatitis patients who subsequently underwent patch testing was requested to complete the questionnaire two times in total: once at their initial visit (before being tested) and 60 days after their test was conducted. As to the global assessments, 359 patients in the study were asked to grade their own disease severity using a score of 0 to 4, with 0 representing no signs and 4 signifying severe signs; physicians also rated the severity using the same grading system.¹³

2.3 | Patch testing

The 107 patients were tested using the European baseline series as well as additional allergens based on the individual patient histories and physical examinations. The allergens (Chemotechnique Diagnostics, Vellinge, Sweden) in aluminum Finn Chambers (SmartPractice, Phoenix, Arizona) were placed on unaffected skin on the upper back. The patches were removed after 48 hours. Reactions were evaluated on day (D) 2 and D4 after the placement of the patches. The results were interpreted according to the International Contact Dermatitis Research Group criteria.¹⁴

2.4 | Statistical analyses

The demographic data were examined using descriptive analysis. The Pearson chi-squared test or Fisher exact test was performed with PASW Statistics, version 18.0 (SPSS Inc., Chicago, Illinois) in order to analyze and compare the proportion of patients in the two groups. A *P*-value of less than .05 was considered to be statistically significant. Those factors that were found to be associated with DLQI and that had a *P*-value of less than .2 were then further assessed by crude odds ratio (OR) and adjusted OR. Binary logistic regression was used to estimate the crude OR, whereas multiple binary logistic regression was used to estimate the adjusted OR. A paired-samples *t* test or Wilcoxon signed-rank test was used to compare the scores of the prepatch and postpatch tests. The median values of the two groups were analyzed using the Mann-Whitney *U* test, whereas the median values of more than two groups were examined using the Kruskal-Willis test. Differences were further assessed using the pairwise comparison method, with significance values adjusted by a Bonferroni correction for multiple tests. Finally, the Spearman rank correlation

TABLE 1 Demographic data and factors associated with quality of life of eczema patients evaluated using the Dermatology Life Quality Index

	N = 519		DLQI categories				Univariate analysis			Multivariate analysis		
			Mean DLQI		DLQI categories		P	Crude OR (95%CI)		P	Adjusted OR (95%CI)	
	n	(%)	9.5 ± 6.4		0-10 (n = 319)	11-30 (n = 200)						
	n	(%)	n	(%)	n	(%)						
Mean age, years ± SD	43.2 ± 16.7		46.3 ± 17.5		38.5 ± 14.3		<.001					
Age groups, years							<.001					
<20	28	(5.4)	6.9 ± 3.8	21	(6.6)	7	(3.5)	1.11 (0.42-2.95)	.84		1.03 (0.36-3.01)	.96
20-59	396	(76.3)	10.3 ± 6.6	225	(70.5)	171	(85.5)	2.52 (1.51-4.23)	<.001		2.13 (1.15-3.95)	.017
≥60	95	(18.3)	6.7 ± 4.6	73	(22.9)	22	(11.0)	1			1	-
Sex							.008					
Female	379	(73.0)	10.0 ± 6.4	220	(69.0)	159	(79.5)	1.75 (1.15-2.65)	.009		1.52 (0.98-2.37)	.062
Male	140	(27.0)	8.5 ± 6.3	99	(31.0)	41	(20.5)	1			1	-
Occupations ^a							.070					
Hand-predominant workers	310	(59.7)	8.5 ± 5.8	112	(35.1)	54	(27.0)	1.00 (0.49-2.04)	.99		1.23 (0.57-2.66)	.61
Face-predominant workers	166	(32.0)	10.2 ± 6.7	178	(55.8)	132	(66.0)	1.54 (0.78-3.02)	.21		1.36 (0.67-2.76)	.39
Others	43	(8.3)	9.0 ± 6.3	29	(9.1)	14	(7.0)	1			1	-
Having personal history of atopy	132	(25.4)	9.8 ± 6.5	78	(24.5)	54	(27.0)		.52			
Having family history of atopy	119	(22.9)	10.6 ± 6.9	65	(20.4)	54	(27.0)	1.45 (0.96-2.19)	.080		1.40 (0.91-2.16)	.13
Predominant sites of lesions												
Face	206	(39.7)	10.2 ± 6.9	120	(37.6)	86	(43.0)		.22			
Hand	153	(29.5)	9.6 ± 6.4	94	(29.5)	59	(29.5)		.99			
Generalized	102	(19.7)	9.2 ± 6.1	63	(19.7)	39	(19.5)		.95			
Others	58	(11.2)	7.8 ± 4.9	42	(13.2)	16	(8.0)	0.57 (0.31-1.05)	.069		0.59 (0.31-1.10)	.098
Mean disease duration, years ± SD	2.5 ± 4.2											
Duration of lesions							.17					
≤1 year	310	(59.7)	9.2 ± 6.2	198	(62.1)	112	(56.0)	1			1	-
>1 year	209	(40.3)	10.1 ± 6.7	121	(37.9)	88	(44.0)	1.29 (0.90-1.84)	.17		1.36 (0.92-2.02)	.13
Disease exacerbation							.001					
≤4 times per year	74	(14.3)	7.5 ± 5.2	60	(18.8)	14	(7.0)	1			1	-
>4 times per year	142	(27.4)	10.5 ± 6.7	78	(24.5)	64	(32.0)	3.52 (1.80-6.87)	<.001		3.36 (1.70-6.65)	.001
Persistent	303	(58.4)	9.6 ± 6.5	181	(56.7)	122	(61.0)	2.89 (1.55-5.40)	.001		3.52 (1.84-6.75)	<.001

Note: P < .05 indicates statistical significance.
Abbreviations: CI, confidence interval; DLQI, dermatology life quality index; OR, odds ratio; SD, standard deviation.
^aHand-predominant workers: houseworker, retired, engineer, agricultural work; face-predominant workers: office worker, business owner, student, medical officer.

coefficient was used to assess the relationship between the global assessments of the patients and physicians.

3 | RESULTS

Of the total of 519 patients, 379 (73.0%) were female and 140 (27.0%) were male. The mean ($\pm$ SD) age was 43.2 ($\pm$ 16.7) years, and the mean ($\pm$ SD) disease duration was 2.5 ($\pm$ 4.2) years. The mean ($\pm$ SD) DLQI score of all 519 patients was 9.5 ($\pm$ 6.4). The demographic data and a comparison of the patients in the two DLQI groups are detailed in Table 1. The univariate and multivariate analyses showed statistically significant differences between the proportions of patients in the low- and high-DLQI groups for different factors (Table 1).

The DLQI scores for each question and a comparison of the factors associated with DLQI (namely, sex, age group, and site) for the individual DLQI questions are illustrated in Figure 1. In the case of sex (Figure 1B), the factor of female gender had significantly higher DLQI scores for Q1, Q2, Q3, and Q4, which related to itching ($P = .008$), embarrassment ($P = .001$), shopping problems ($P = .001$), and clothing choices ($P = .048$), respectively. In comparison, male gender had a significantly higher DLQI score for Q9, which dealt with sexual difficulties ($P = .017$). Compared with the age group of 60 years or older, the

20 to 59-year age group had significantly higher DLQI scores for Q2 to Q7, which focused on embarrassment ($P < .001$), shopping problems ($P < .001$), clothing choices ($P < .001$), social activities ($P < .001$), sport ($P < .001$), and work and study ($P < .001$), respectively (Figure 1C). Regarding the sites of the lesions (Figure 1D), the facial dermatitis patients had a significantly higher score for Q2 (embarrassment) than the other-location subgroup ($P = .011$). The facial dermatitis patients also had significantly higher scores for Q3 (shopping problems) and Q5 (social activities) than the generalized-location and other-location subgroups ($P < .001$ and $P = .006$, respectively). In addition, facial dermatitis patients had a significantly higher score for Q6 (sports limitation) than the hand- and generalized-location subgroups ($P = .001$). The hand dermatitis patients had a significantly higher score for Q3 (shopping problems) than the generalized dermatitis patients ($P < .001$). The hand dermatitis patients also had a significantly higher score for Q7 (work and school limitations) than the other-location subgroup ($P = .021$). As to the generalized dermatitis patients, they had a significantly higher score for Q1 (itching) than the hand-, face-, and other-location subgroups ($P = .001$).

Concerning clinical assessments, the proportion of patients with higher disease severity gradings given by both the patients and the physicians was greater for the high-DLQI group (Table 2). The Spearman rank correlation between the patients and the physicians' global assessments was 0.535 ($P < .001$).

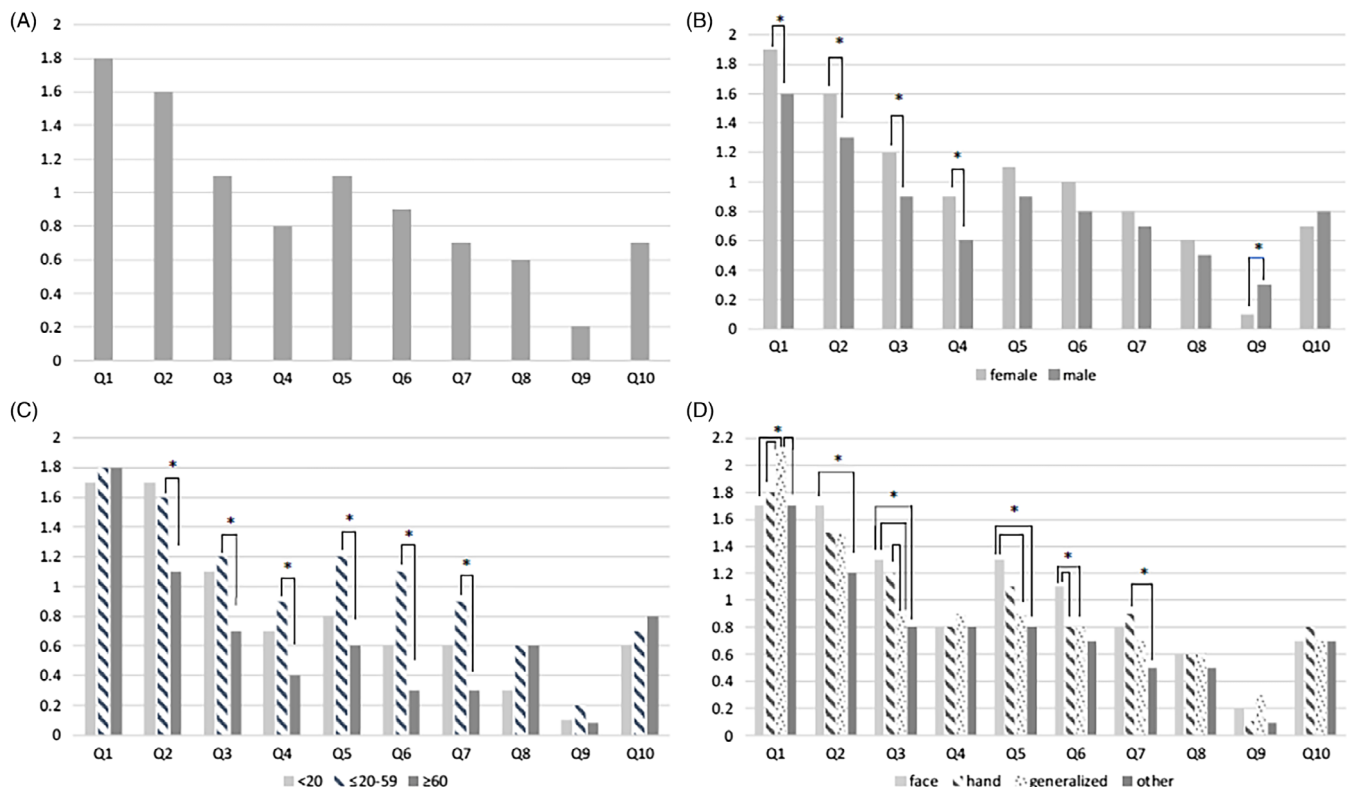


FIGURE 1 Dermatology Life Quality Index scores of all 519 patients: (A) mean score of each question; (B) mean score of each question, comparing between sex; (C) mean score of each question, comparing between age groups; (D) mean score of each question, comparing between predominant sites of lesions. Q, Questions are ordered in accordance with the Dermatology Life Quality Index. ⁶ * $P < .05$ indicates statistical significance

TABLE 2 Association between clinical severity using physician and patient global assessments and quality of life

		DLQI categories (n = 359)			Odds ratio (95%CI)	P
		0-10 (n = 214) n (%)	11-30 (n = 145) n (%)	P		
Physician global assessment		Mean DLQI				
1	7.2 ± 5.8	101 (47.2)	34 (23.4)		1	
2	10.6 ± 6.3	73 (34.1)	55 (37.9)		2.24 (1.33-3.78)	.003
3	13.2 ± 7.2	26 (12.1)	40 (27.6)		4.57 (2.44-8.57)	<.001
4	12.5 ± 6.3	14 (6.5)	16 (11.0)		3.40 (1.50-7.68)	.003
Patient global assessment						
1	5.5 ± 5.5	62 (29.0)	7 (4.8)		1	
2	8.9 ± 6.0	78 (36.4)	39 (26.9)		4.43 (1.85-10.58)	.001
3	11.8 ± 6.2	46 (21.5)	58 (40.0)		11.17 (4.67-26.71)	<.001
4	13.3 ± 6.9	28 (13.1)	41 (28.3)		12.97 (5.18-32.46)	<.001

Note: $P < .05$ indicates statistical significance.

Abbreviations: CI, confidence interval; DLQI, dermatology life quality index.

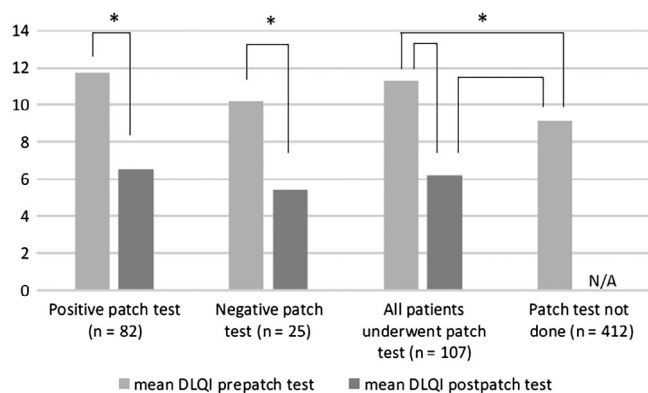


FIGURE 2 Comparison of the mean Dermatology Life Quality Index (DLQI) scores before and after the patch testing of the 107 patients, and the scores of the 412 patients for whom patch testing was not done. N/A, not applicable. * $P < .05$ indicates statistical significance

A comparison of the mean DLQIs of the various groups of patients who were, and were not, patch tested is illustrated in Figure 2. The mean total DLQI score of the patients who underwent testing decreased significantly after the testing was done, and irrespective of whether their initial patch test results were positive or negative ($P < .001$). The mean DLQI score ($\pm$ SD) of those patients who had positive patch test reactions decreased from 11.7 ($\pm$ 6.1) to 6.5 ($\pm$ 6.3), whereas the DLQI score of the patients with negative results fell from 10.2 ($\pm$ 5.8) to 5.4 ($\pm$ 5.0) after testing. The mean total DLQI score of those patients who underwent a patch test (the prepatch test DLQI score) was higher than the corresponding score for the patients for whom a patch test was not done ($P = .001$). Moreover, the mean total DLQI score of the patients who underwent a patch test (the postpatch test DLQI score) was lower than the mean score of the patients for whom patch testing was not performed ($P < .001$). A significant decrease in the mean DLQI score was seen after patch testing for the questions related to several issues (Figure 3).

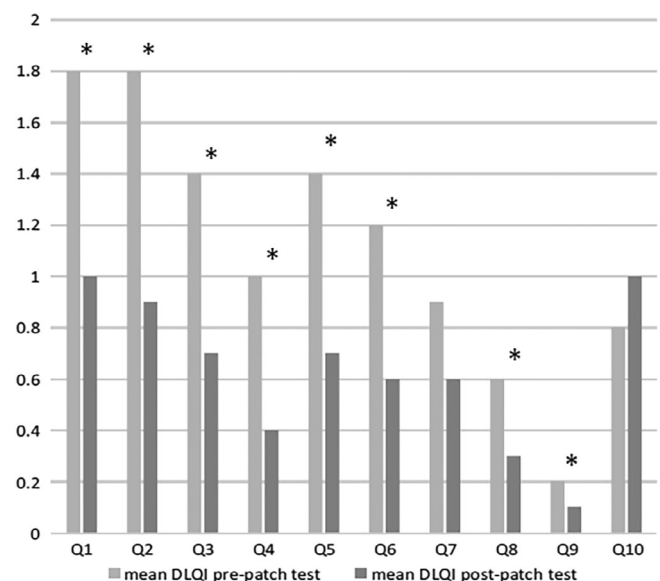


FIGURE 3 Mean score for each Dermatology Life Quality Index (DLQI) question for the 107 patch tested patients. Q, Questions are ordered in accordance with the DLQI.⁶ * $P < .05$ indicates statistical significance

4 | DISCUSSION

This study has found a mean DLQI score of 9.5, which was comparable with the DLQI scores of dermatitis patients reported by earlier studies, which ranged from 8.3 to 15.1.^{15,16} However, the score of 9.5 was higher than those that had been reported for patients suffering from other skin conditions (eg, psoriasis): their DLQI scores ranged from 6.8 to 7.5.^{16,17}

Our study found that factors such as age group and the frequency of exacerbation could have a significant effect on a patient's QoL. The reason might be that the working-age group is involved in more social activities; therefore, any condition that might affect their appearance

and their ability to work could have a greater impact on the QoL. A higher frequency of dermatitis caused the patients in the present study to have a worse DLQI; this is unsurprising and similar to other research findings for hand dermatitis patients.³ An equal impairment of the overall QoL of both sexes was observed.¹⁸ Although the factor of female gender did not demonstrate statistical significance after the multivariate analysis was conducted in the present study, the factor seemed to be an associated factor in our univariate analysis. We had previously assumed that the anatomical site of patients' dermatitis might affect the overall DLQI, with facial dermatitis patients suffering the most. Nevertheless, there was no statistical significance for the sites of lesions on the overall DLQI, which proved that the site of lesions had no impact on QoL.¹⁹ A disease duration of more than 1 year also had no impact on the overall QoL, which may be due to patients with more chronic disease being better able to adjust themselves to daily life.

As to the aspects of each DLQI question for all patients (Figure 1), the highest score in our study was for itching, whereas the lowest was for sexual difficulties. These findings reflect the importance of relieving the symptoms (especially itching) of dermatitis patients due to the fact that they could have a detrimental effect on patients' QoL. The diminution of the DLQI related to sexual problems might be explained by the behavior and nature of people who normally feel uncomfortable discussing issues relating to their sex lives. The comparison of the scores for each DLQI question found that the females tended to suffer with more aspects of their life than the males, which is in agreement with the results of another study.²⁰ The males in our study tended to be more concerned than the females with sexual difficulties. This might be explained by the nature of females, who are inclined to care more about personal appearance than males; by contrast, males generally place more emphasis on their sex life. The results for the age groups were similar to the proportion of patients in the high- and low-DLQI groups. The reason was probably that members of the working-age group are more involved in work and social activities than other age groups; consequently, dermatitis seems to have an effect on various aspects of their lives.

Figure 1D demonstrates the mean DLQI score of each question, comparing between the predominant locations of the lesions. Although there were no significant differences in the overall DLQI scores for the various lesion sites (Table 1), facial dermatitis caused significantly more embarrassment (Q2; Figure 1D) than the sites encompassed by the other-location subgroup. This is probably because the face is an area that is hard to cover and very easy to notice.⁵ Generalized dermatitis was associated with most problems with itching, relative to the three other-site subgroups. This is not surprising as an extensive area of dermatitis would inevitably produce more symptoms. Hand dermatitis caused more significant impairments for work and study than the other-location subgroup; this is most likely because many occupations are heavily hand dominated. Our finding is similar to those of previous studies, which stated that hand dermatitis was a work-related disease that had a negative impact on work.⁴ In summary, the current study

found that each of the patient and disease factors could affect different aspects of the QoL.

The intensity of the psychological stress stemming from the skin disease varied with each patient, and it was not always correlated with clinical severity. By contrast, disease severity seemed to play an important role in other studies.^{5,7,8} Clinical severity, as evaluated by the global assessments, was also in concordance with the DLQIs of patients as greater disease severities were found to be related to higher DLQI scores (Table 2). This result was in accordance with other studies on dermatitis.^{18,21} Concerning the Spearman rank correlation coefficient between the patient and physician global assessments in this study (0.535, $P < .001$), a positive moderate correlation was found. However, it is important to note that patients tended to express their QoL in concordance with the severity of their lesions more often than the physicians did, as shown by the higher ORs of the patients' global assessments than the physicians' global assessments. Therefore, the lower physician global assessment scores did not directly imply that patients would have a lower DLQI score. The DLQI scores and clinical assessments by the patients themselves should not be ignored.

In some studies, using patch testing to identify external causes that patients could avoid was found to improve their QoL as well.¹⁵ In our study, those patients who underwent patch testing had higher prepatch test DLQI scores than patients for whom the testing was not carried out. This difference might be explained by the fact that the patients who underwent the testing had more questions and concerns in general. After the tests were conducted, the DLQI scores decreased significantly for patients overall, both for patients with positive results and for those with negative results. Most of the questions had significantly lower DLQI scores after the patients underwent patch testing, except for those questions dealing with work and study limitations and the problems caused by treatment. The mean postpatch test DLQI score was even significantly lower than that for patients for whom the tests had not been performed. Patch testing has again been confirmed to be a useful tool to help improve QoL, regardless of whether the results were positive or negative.^{15,22} The process surrounding patch testing might be a reason for the improved QoL. For instance, patients undergoing patch testing have a few additional visits with the dermatologist that involve detailed discussions of the causes and treatments. Given that patch testing is a beneficial tool in that it tends to allay the concerns and anxiety that patients might have, the referral of dermatitis patients for patch testing should be encouraged. A limitation of this study was that the study population was gathered from patients who visited our tertiary care referral center; their dermatitis might have been somewhat more severe, or at least a cause for heightened concern.

In conclusion, being in the working-age group and having more frequent disease exacerbations had a significant negative impact on QoL of the dermatitis patients studied. The clinical severity assessed by the patients was directly associated with their DLQIs. The DLQI of each question showed that, although the female gender and working-age group had more impairments on various aspects of life, the site of the lesions impacted each question differently. Moreover, patch

testing was found to improve almost every aspect of DLQI irrespective of whether the test results were positive or negative. The findings demonstrate that a patch test as a noninvasive investigation for dermatitis patients can significantly improve their QoL. We suggest that health-care practitioners inform all dermatitis patients of the benefits of patch testing and refer them for testing to provide them with the best patient care.

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AUTHOR CONTRIBUTIONS

Waranya Boonchai: Conceptualization; data curation; formal analysis; investigation; methodology; resources; supervision; validation; visualization; writing-original draft; writing-review and editing. **Norramon Charoenpipatsin:** Data curation; formal analysis; resources; writing-original draft; writing-review and editing. **Waranaree Winayanuwattikun:** Data curation; formal analysis; resources; writing-original draft. **Sutasinee Phaitoonwattanakitj:** Data curation; formal analysis; resources; writing-original draft. **Thanisorn Sukakul:** Conceptualization; data curation; formal analysis; investigation; methodology; resources; supervision; validation; visualization; writing-original draft; writing-review and editing.

CONFLICT OF INTEREST

All authors have no conflicts of interest or financial support to declare.

ETHICAL VETTING

This study was approved by the Ethics Committee of the Siriraj Institutional Review Board (Si507/2014).

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