

ORIGINAL ARTICLE

Life quality of Chinese patients with chronic urticaria as assessed by the dermatology life quality index

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Abstract

Background No report focused on the life quality of Chinese patients with chronic urticaria (CU). It was also due to lack of data to assess the usage of the Dermatology Life Quality Index (DLQI) in Chinese patients.

Objectives We explored the quality of life (QoL) of Chinese patients with CU and assessed the factor structure and reliability of the Chinese version of the DLQI.

Methods The DLQI scores were recorded to evaluate the life quality of out-patients with CU. The reliability and the factor structure of the DLQI were assessed using reliability analysis and factor analysis.

Results A total of 131 patients completed the DLQI. The mean score was 9.93 that was significantly associated with the patient's age ($P = 0.01$). Chronic urticaria had the greatest effect on the 'Syndrome and Feeling' (50.64%), followed by 'Work/School' (41.98%). A reliability analysis showed that the value of the *Cronbach's* α reached 0.85 if item 1 in the DLQI was excluded. Both exploratory and confirmatory factor analysis indicated that there were two latent common factors underlying the items in the questionnaire.

Conclusions Chronic urticaria has a moderate impact on the life quality. More attention should be paid to the interference from item 1 in assessing the QoL by the DLQI, although it remains a concise tool with high reliability.

Received: 28 June 2011; Accepted: 30 August 2011

Conflict of interest

None declared.

Funding sources

None declared.

Introduction

Chronic urticaria (CU) is characterized by spontaneously erythematous wheals, intense itch with or without angioedema and relapse over 6 weeks.^{1,2} No previous study had accurately accounted for the prevalence of CU, although some reports suggested that urticaria afflicts approximate 10–20% people at least once in their lives.¹ In the majority of patients with CU, the aetiology is unclear, leading to difficulties in treatment and high rates of recurrence. Patients with CU are often asked to take medicines for months or years, but a fraction of patients are medically intractable.³ The recurrent fierce itching and long duration of treatment may impair the quality of life (QoL) of these patients.⁴

There were several instruments that can be used to assess the QoL in individuals with skin diseases. The Dermatology Life Quality Index (DLQI) was the first dermatology-specific instrument to assess the QoL impairments resulting from skin diseases.^{5,6} The DLQI is a self-administered questionnaire that measures the QoL in the last week before interview in patients. Since its introduction in 1994, the DLQI had been translated into more than 50 lan-

guages and used to assess the QoL in patients with more than 30 skin conditions.^{6–11} The DLQI has been shown to be robust and concise in assessing the QoL and for evaluating the efficacy of treatment and intervention.^{8,12–15} Previous studies using the DLQI, however, found different factor structures and reliability estimates for different skin conditions and between populations.⁷ To date, there are no reports of QoL among Chinese patients with CU using the DLQI. Furthermore, there has been no reliability analysis on the DLQI in Asian populations. In this study, we used the DLQI to evaluate the QoL of patients with CU in China to illuminate the ways in which CU impacts QoL. Moreover, we analysed the factor structure and the reliability of the DLQI for Asian CU patients.

Methods

The inclusion criteria were: (i) individuals with erythematous wheals with or without angioedema every day or almost every day lasting for at least 6 weeks,¹ (ii) patients older than 18 years and (iii) patients who could read and answer the questions in the

DLQI by themselves. The following patients were excluded: (i) patients with physical urticaria, including cold urticaria, pressure urticaria, solar urticaria and cholinergic urticaria, (ii) patients treated in the last week before the interview and whose symptoms had improved, (iii) patients where the wheals were symptoms of other diseases, for example, systemic lupus erythematosus, urticaria vasculitis or drug eruption, (iv) patients with other skin disorders or serious systemic diseases that could also impact QoL or (v) patients who did not answer all the questions in the DLQI.

Ethical permission for this study was granted by the Ethic Committee of Shenzhen Bao'an Maternal and Child Health Hospital. All the subjects were patients interviewed in the hospital and diagnosed with CU from January to April 2011. After informed consent was received, patients with CU were asked to complete the DLQI at the first interview. There are 10 items in the DLQI in six subsections: Symptoms and Feelings (items 1 and 2), Daily Activities (items 3 and 4), Leisure (items 5 and 6), Work and School (item 7), Personal Relationships (items 8 and 9) and Treatment (item 10). Four options are listed under every item: 'not at all', 'a little', 'a lot' and 'very much' which are scored as 0, 1, 2 and 3 respectively. Some items have a fifth option of 'not relevant' scored as zero. The scores for the 10 items are added up for a total score from 0 to 30. A higher score indicates greater impairment of QoL. The impairment of the QoL was also presented as a percentage of the maximum score of 30. A percentage of either 3 or 6 was used to indicate the impairment in the six sections mentioned above.⁶ We used the official Chinese version downloaded from www.dermatology.org.uk.

A mean $\pm$ the standard error or a median $\pm$ the interquartile range ($M \pm Q$) was used to describe continuous variables according to the data distribution. Kolmogorov–Smirnov test was used to identify the normality of the distribution of the variables. Student's *t*-test or Mann–Whitney *U*-test was used to assess statistically significant differences between the means or medians. The reliability and the internal consistency were assessed using Cronbach's alpha coefficient, and alpha equal to or greater than 0.70 was considered satisfactory. Factor analysis was used to elucidate the factor structure underlying the items in the DLQI. An exploratory factor analysis (EFA) was performed, followed by a confirmatory factor analysis (CFA). To assess the model fit, we used The Tucker–Lewis index (TLI), Bentler's comparative fit index (CFI) and the root mean square error of approximation (RMSEA) as the model fit indices. For TLI and CFI, high values (>0.9) indicate a good-fitting model, whereas 0.05 or less of RMSEA means good fitting. Statistical analyses were performed using the Statistical Package for the Social Sciences (version 13.0, SPSS Inc., Chicago, IL, USA) and Amos 17.0. An α level of 5% ($P < 0.05$) was considered statistically significant.

Results

In total, 148 patients with CU were asked to complete the questionnaire. Three patients had other serious disorders (one with hypertension, one with endometriosis, one with vitiligo). Two

cases were diagnosed with cold urticaria, two with pressure urticaria, two with cholinergic urticaria and one with solar urticaria. Two patients left two items unanswered in the DLQI and five left one item. Finally, data from 131 patients were analysed, including 48 men and 83 women. The mean age of the patients was 32.94 ± 0.70 years (range, 18–59). No statistically significant difference was found between the ages of male and female patients (34.69 ± 1.26 years vs. 31.93 ± 0.81 years, $t = 1.93$, $P = 0.056$). The median duration of CU was 6 months with a range from 1.5 months to 168 months. No statistically significant difference was detected with respect to the duration of illness between male and female patients (Mann–Whitney *U*-test, $Z = 0.215$, $P = 0.83$).

Dermatology Life Quality Index scores

The score for items in the DLQI ranged from 20% for the Relationship to 69.33% for the Symptoms. There was no statistically significant difference between men and women for most items except for Daily Activities ($P = 0.02$) and Work/School sections ($P = 0.03$) (Tables 1 and 2). The total score of the DLQI in patients with CU ranged from 1 to 26 with a mean of 9.93 ± 0.46 . The mean score for men (8.88 ± 0.77) was slightly lower than that for women (10.54 ± 0.58), but the difference was not statistically significant (Table 1). The DLQI scores were significantly correlated with the age of the patients (Pearson correlation coefficient = -0.22 , $P = 0.01$). This correlation was present even when adjusted by gender and the duration of CU. This association was observed in male patients (Pearson correlation coefficient = -0.39 , $P = 0.01$), but absent in female patients (Pearson correlation coefficient = -0.08 , $P = 0.50$) (Fig. 1). Considering the sections described by Finlay,⁶ the highest impact of the disease was on Symptom and Feeling (50.64%), followed by Work and School (41.98%) (Table 2). Female patients scored higher than male patients in all sections, although a statistically significant difference was found only for Work and School. In total, CU had a moderate impact (33.1%) on the QoL of this patient sample.

Reliability statistics

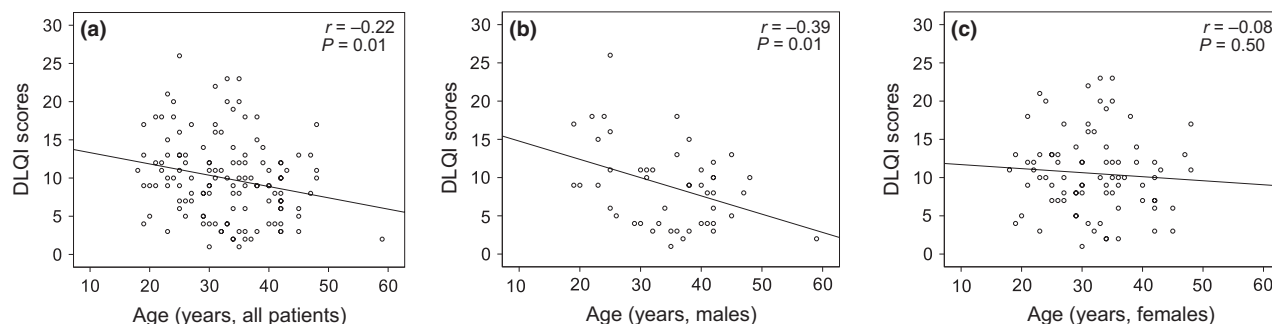
ANOVA with Friedman's test showed $\chi^2 = 320.61$ ($P < 0.001$), which indicated good repeatability using the DLQI of Chinese version. Hotelling's *T*-squared test showed $F = 41.87$ ($P < 0.001$), which indicated a correlation among the mean score for each item in the DLQI, indicating strong internal consistency among the items. The Cronbach's alpha was 0.82, and it became 0.84 when item 1 was deleted. The alpha value reached 0.85 after standardization, which was higher than the traditional threshold of 0.7.¹⁶ In contrast, item 1 (Over the last week, how itchy, sore, painful or stinging has your skin been?) slightly decreased the reliability of the Chinese DLQI. The correlation matrix revealed that the correlation coefficients (*r*) among the items ranged from 0.004 to 0.57 with a mean of 0.33. Item 1 in DLQI had a small *r* (<0.2) with the other items (the mean *r* = 0.10). The mean *r* among items reached 0.38 when item 1 was excluded (Table 3).

Table 1 Scores for items in Dermatology Life Quality Index in patients with chronic urticaria

DLQI items	Mean score (%)			Mann-Whitney test (P-values)
	All	Male	Female	
Symptoms	2.08 (69.33)	2.06 (68.67)	2.08 (69.33)	0.84
Feeling	0.96 (32.00)	0.92 (30.67)	0.99 (33.00)	0.54
Daily activities	0.91 (30.33)	0.71 (23.67)	1.02 (34.00)	0.02
Choice of clothes	0.78 (26.00)	0.67 (22.33)	0.84 (28.00)	0.12
Social/leisure	1.02 (34.00)	0.88 (29.33)	1.10 (36.67)	0.20
Sports	0.75 (25.00)	0.79 (26.33)	0.72 (24.00)	0.87
Work/school	1.26 (42.00)	0.92 (30.67)	1.46 (48.67)	0.03
Relationships	0.60 (20.00)	0.52 (17.33)	0.64 (21.33)	0.32
Sexual difficulties	0.63 (21.00)	0.54 (18.00)	0.67 (22.33)	0.12
Treatment	0.96 (32.00)	0.88 (29.33)	1.01 (33.67)	0.37
Total	9.93 (33.10)	8.88 (29.60)	10.54 (35.13)	0.08*

*Student's *t*-test.**Table 2** Scores by section in the Dermatology Life Quality Index in patients with chronic urticaria

	Full mark	All patients	Male	Female
Symptoms/feelings	6	3.04 ± 0.10 (50.64%)	2.98 ± 0.18 (49.65%)	3.07 ± 0.12 (51.20%)
Daily activities	6	1.69 ± 0.13 (28.12%)	1.38 ± 0.24 (22.92%)	1.87 ± 0.16 (31.12%)
Leisure	6	1.76 ± 0.13 (29.39%)	1.67 ± 0.22 (27.78%)	1.82 ± 0.16 (30.32%)
Work and school	3	1.26 ± 0.11 (41.98%)	0.92 ± 0.15 (30.56%)	1.46 ± 0.14 (48.59%)*
Personal relationships	6	1.22 ± 0.10 (20.36%)	1.06 ± 0.18 (17.71%)	1.31 ± 0.12 (21.89%)
Treatment	3	0.96 ± 0.07 (32.06%)	0.88 ± 0.12 (29.17%)	1.01 ± 0.09 (33.73%)

P* = 0.03. The values in parentheses are percentages of the full mark.Figure 1** Bivariate correlation between the Dermatology Life Quality Index (DLQI) score and the age of (a) all patients with chronic urticaria ($r = -0.22$, $P = 0.01$). A significance (negative) correlation was found for (b) male patients ($r = -0.39$, $P = 0.01$), but not for (c) female patients ($r = -0.08$, $P = 0.50$).

Exploratory factor analysis

As item 1 decreased the reliability of the questionnaire, the analysis for the factor structure did not include item 1. Bartlett's test of sphericity showed $\chi^2 = 368.26$ ($P < 0.001$); the Kaiser–Meyer–Olkin measure of sampling adequacy had a value of 0.88, which indicated that the dataset could be analysed by the factor analysis and that common factors might be found. Principal component analysis revealed that there were two initial eigenvalues greater than one with a cumulative contribution of 56.88% (Table 4). These results meant that the DLQI was constructed by two dimen-

sionalities (factors). Items 2 to 6 had large load on one factor and items 7 to 10 had large load on another (Fig. 2).

Confirmatory factor analysis

The CFA was performed using Amos software. The load of the items on the two factors ranged from 0.56 to 0.76 (after standardization). There was an association between these two latent factors (correlation coefficient: 0.82). The χ^2 of the model was 49.67 ($P = 0.566$), which meant the hypothesis of the two-factor model could be accepted. The indicators of the model fit, RMSEA < 0.05,

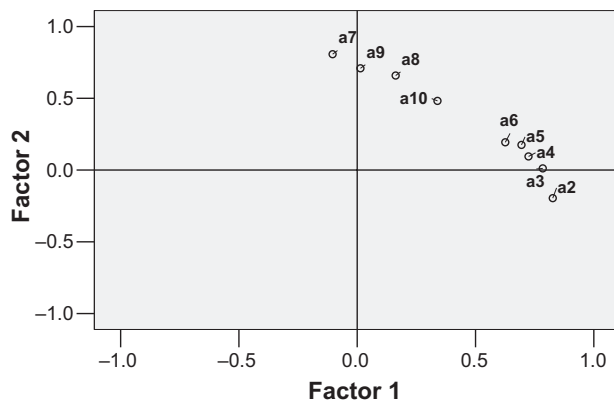
Table 3 Reliability analysis: correlation matrix of the items in the Dermatology Life Quality Index

	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10
Item 1	0.11	0.10	0.12	0.06	0.09	0.17	0.07	0.004	0.19
Item 2		0.47	0.42	0.43	0.35	0.16	0.30	0.24	0.31
Item 3			0.50	0.57	0.44	0.27	0.33	0.31	0.44
Item 4				0.50	0.55	0.25	0.35	0.37	0.44
Item 5					0.54	0.36	0.45	0.28	0.45
Item 6						0.30	0.43	0.29	0.40
Item 7							0.35	0.30	0.41
Item 8								0.46	0.39
Item 9									0.32

Table 4 Total variance explained in the exploratory factor analysis

Factor	Initial Eigenvalues			Extraction sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.10	45.53	45.53	4.10	45.53	45.53
2	1.02	11.35	56.88	1.02	11.35	56.88
3	0.79	8.77	65.65			
4	0.66	7.38	73.03			
5	0.61	6.81	79.84			
6	0.54	5.97	85.80			
7	0.52	5.73	91.53			
8	0.39	4.35	95.88			
9	0.37	4.12	100.00			

Extraction method: principal component analysis.

**Figure 2** Factor plot in rotated space, a2 through a10 represent item 2 through 10 in Dermatology Life Quality Index (DLQI).

CFI > 0.9 and TLI > 0.95, were quite adequate goodness-of-fit indices (Fig. 3). We tried to add the item 1 of the DLQI in this model. The load of the item 1 (0.15), however, was too small to be accepted in the model. We also tried a second-order model, but the model failed to be convergence. Thus, this first model appeared to be the best because it was the more parsimonious.

Discussion

Recurrent itch and recurrent lesions negatively impact the QoL of patients with CU.¹⁷ Several instruments had been used to assess the QoL in CU patients.^{5,6,18} As the most commonly used instrument, the DLQI has shown high validity, feasibility and simplicity for assessing the QoL in patients with dermatology-related conditions.⁷ However, there are obstacles when studying the life quality in CU patients in Asia because we found no analysis of the DLQI for this population, the world's largest. Herein, we initially assessed the impairment of QoL in Chinese patients using the official Chinese version of the DLQI and analysed its reliability and factor structure. What we found was that the DLQI is indeed useful for assessing the impact of CU on patients' life quality and to evaluate the efficacy of therapeutic intervention.

We analysed the impact of CU on different aspects of QoL. As described previously,¹⁷ the greatest impact of CU was on Symptom/feeling (50.64%) and Work/school (41.98%). In our study, CU showed a relative modest impact on Personal relationships (20%) and Daily activities (28%). Chronic urticaria impacted the QoL of men and women about equally, but there were differences in the subdomains. Women were slightly more disabled in all aspects of life measured than men, although differences were only significant for Daily activities and Work/school (Tables 1 and 2).

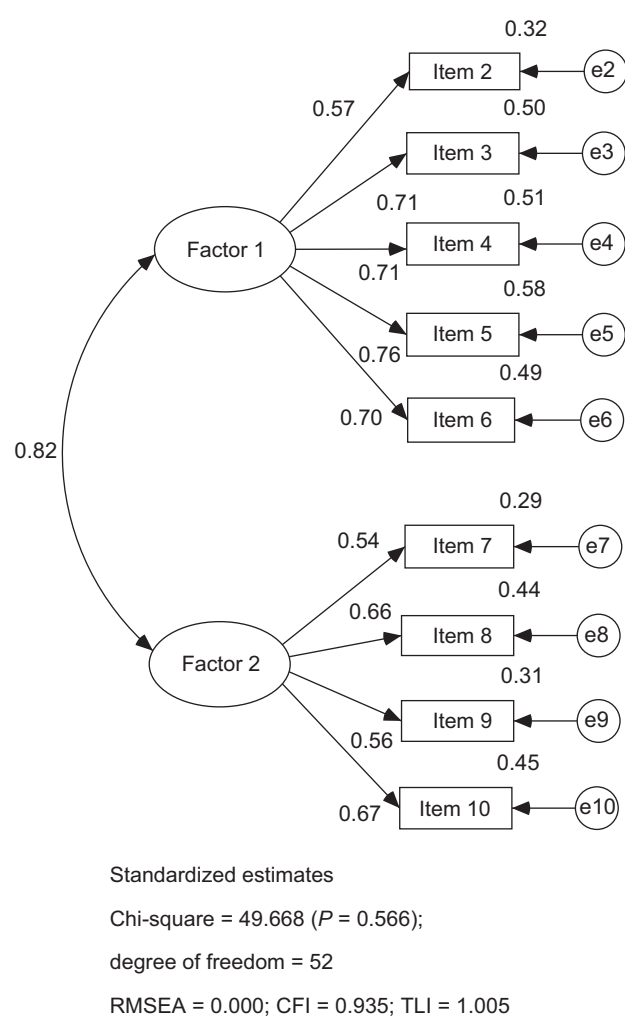


Figure 3 Confirmatory factor analysis of the Dermatology Life Quality Index (DLQI). e2–e10 indicate the errors of the items. The values on the top right of the rectangular boxes are the squared multiple correlations of the items. One-way arrows indicate the paths and their coefficients (loads of the items). The two-way arrow indicates the correlation between the factors and the coefficient. RMSEA, root mean square error of approximation; CFI, comparative fit index; TLI, Tucker–Lewis index.

In most previous reports,^{18–20} but not all,¹⁷ women were more troubled by CU than men. Mlynek suggested three possible reasons for the greater severity in women, different aetiology/pathogenesis, different sensitive to the irritation and different anatomical patterns in men from women.¹⁸ As the DLQI is a self-administered questionnaire, it is also possible that men and women give different response to the same question due to differences in social life experience and ways of thinking. A more gender neutral test or one with a separate section that probes these possible gender-specific differences should be developed and used to identify the difference between men and women.

In the present study, the mean score on the DLQI was 9.93, indicating a moderate impairment in QoL. This score was reasonably close to those reported previously in both Chinese populations (9.41)²¹ and populations from other countries (9.80 on an average, range, 7.16–13.40).⁷ Considering that the subjects questioned were outpatients and would be suffering from more severe cases of CU, these DLQI scores may be inflated due to selection bias. Thus, we assume that the general negative impact of CU would be slightly lower in population-based samples of CU patients than we measured. However, this assumption is not consistent with previous studies.^{17,18,22} On the contrary, pruritus is nearly always present in patients with untreated CU. A positive response to item 1 from all patients would decrease the selective efficiency of the question. Moreover, in our opinion, item 1 is focused on the symptoms of the disease instead of on the impact to QoL. This view was supported by the reliability analysis in the present study.

Our results revealed that the impairment in QoL was associated with the age of patients (Fig. 1a). This finding was somewhat similar to the findings of Mlynek, who reported the younger patients were more affected on functioning and itching/embarrassment.¹⁸ However, this association was absent in women in our study, which was inconsistent with the previous results.¹⁸ One reason for the difference might be that Mlynek used the German version of the Chronic Urticaria Quality-of-Life Questionnaire instead of the DLQI to assess QoL. The response bias would be another reason for the difference, because both these instruments are self-administered. In other studies, no significant association was found between age and QoL impairment in patients with CU.^{17,20} Whether this difference between studies resulted from the different patient samples, different languages (translation) or differences between cultures, requires further study. Establishing a clearer relation between the age of the CU patient and QoL could help physicians make more informed decisions to improve the patient's QoL.

It was reported that DLQI took on different dimensionalities and reliabilities when it was used in patients with different diseases, or in different sample populations.⁷ Wang explored the reliability and validity of the Chinese version of DLQI, and showed that it had a unidimensional pattern with a high reliability,²¹ in agreement with the report of Lennox.¹⁴ In Wang's study, the authors included 215 patients with eczema, psoriasis, vitiligo, acne and other diseases, but only 17 cases of urticaria were included. This small sample size could not adequately illuminate the impact on Chinese patients' QoL. Our results demonstrated that the Chinese DLQI had a two-dimension pattern used to assess the QoL of patients with CU. Items 2 through 6 had a large load on factor 1 (may be defined as personal life factor) and items 7 through 10 loaded largely on factor 2 (may be defined as social life factor). Results from reliability analysis revealed that item 1 decreased the reliability of the DLQI, a finding inconsistent with previous studies.⁷ In our opinion, the reason for this decrease in reliability is that item 1 (Over the last week, how itchy, sore, painful or

stinging has your skin been?) probes the severity of the disease, not the QoL. This hypothesis was supported by our confirmatory factor analysis. The reasons for the inconsistent findings of factor analysis in this study from the previous ones could be sourced from the different language or culture between the Eastern and Western countries.

We initially analysed the factor structure and reliability of the Chinese version of the DLQI in a hospital-based sample of CU patients, and found CU to be moderately impaired QoL in Chinese patients. DLQI had a two-dimension pattern with high reliability and concision for assessing the QoL in CU patients. Item 1 had a negative impact on the reliability of DLQI.

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