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CLINICAL REPORT

Dermatology Life Quality Index: Data from Danish Inpatients and Outpatients

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The aim of the present study was to provide data on the reliability and validity of a Danish translation of the Dermatology Life Quality Index (DLQI), a short measure of the impact of dermatological diseases on quality of life. The DLQI was administered to 200 outpatients and 100 hospitalized patients suffering from a range of dermatological diseases and to 100 sex- and age-matched healthy controls. Mean scores, internal consistency and test–retest reliability were comparable to the results reported for the original English version. Hospitalized patients reported greater impairment of disease-related quality of life than outpatients, and patients with atopic dermatitis and psoriasis exhibited greater scores than patients suffering from other dermatological diseases. Discriminant, construct and predictive validities of the Danish translation of the DLQI were satisfactory, as indicated by significant associations between DLQI scores and physician-rated disease severity, disease duration and the time patients were willing to spend each day on a hypothetical effective treatment. The results also suggest that the emphasis Danish patients place on various aspects of disability covered by the questionnaire is similar to that of English patients. In conclusion, the Danish translation of the DLQI showed satisfactory reliability and the preliminary results indicate that this version is a valid measure, which can be used in both research and clinical settings. *Key words: quality of life; reliability; validity.*

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Although clinicians have long recognized that skin disease may have a significant impact on the quality of life (QOL), it is only recently that attempts have been made to systematically assess and quantify the psychosocial impact of dermatological disease (1). Traditionally, clinical assessments of treatment efficacy have relied mainly on physician's rating of different skin signs. Significant improvement measured by such ratings may not always be reflected in a corresponding improvement in subjective QOL, and two patients with the same physician's rating may have dramatically different QOL outcomes (2). In recent years, several disease-specific measures have been developed to evaluate the psychosocial impact of psoriasis, atopic dermatitis and acne (3–5). Such measures cannot, however, be used to compare different dermatological diseases. Skin disease may have a significant impact on relationship to others, self-image and self-esteem in ways that are different from the impact of other non-dermatological diseases. General health-related QOL measures, e.g. Short Form-36 (SF-36) (6), may therefore not be sufficiently sensitive to record the non-specific impact of skin diseases. To address this problem, the Dermatology Life Quality Index (DLQI) (7) was developed as a short, compact measure of the non-specific impact of dermatological diseases for use as an assessment tool in daily clinical practice. The DLQI has been shown to be a reliable and valid measure of QOL (8, 9) in both English and other cultural contexts (10, 11).

The aim of this study was to provide data to investigate the reliability and validity of a Danish translation of the DLQI. The DLQI was originally validated using a sample of dermatology patients with a variety of skin diseases attending an outpatient clinic (7). Given that the Danish version of the DLQI (DLQI-DK) was a reliable and valid measure, we expected the score distributions and reliability of the DLQI-DK to be similar to those obtained in the original sample when tested in a sample of Danish dermatology outpatients. To further test the validity of the DLQI-DK, we also included a sample of hospitalized dermatology patients. We expected that the DLQI scores of this sample would indicate a more severe impairment of QOL when compared with the outpatient sample, and that both groups of dermatology patients would have significantly greater scores than a control group of healthy subjects. Likewise we expected that higher DLQI scores would be associated with greater symptom severity, as assessed by a dermatologist, with longer disease duration and with a willingness of patients to spend more time on a hypothetical effective treatment of their disease. It is possible that patients from different cultures may place different emphasis on various aspects of disability covered by the questionnaire (7) and the results of our study were designed to provide additional data on the validity of the DLQI in a different cultural context.

MATERIALS AND METHODS

The DLQI

The DLQI (7) consists of 10 items covering symptoms and feelings (items 1 and 2), daily activities (items 3 and 4), leisure (items 5 and 6), work or school (item 7), personal relationships (items 8 and 9) and treatment (item 10). Each question has four alternative responses: "not at all", "a little", "a lot" and "very much" with corresponding scores of 0, 1, 2 and 3, respectively. The total score is calculated by summing the score of each question, and total scores range from a minimum of "0" to a maximum of 30, with higher scores representing greater impairment of QOL.

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Table I. *Sex, age, mean total and range of scores on the DLQI*

Diagnosis	No. of patients (men/women)		Mean age (years)		Mean (SD) DLQI score		Range of DLQI scores	
	Outpatients	Hospitalized	Outpatients	Hospitalized	Outpatients	Hospitalized	Outpatients	Hospitalized
Psoriasis	19 (7/12)	31 (13/18)	47	51	13.3 (8.7)	12.3 (7.3)	2–30	2–29
Atopic eczema	14 (3/11)	21 (7/14)	26	29	15.3 (8.1)	16.2 (7.4)	2–26	1–29
Other eczema	38 (14/24)	17 (6/11)	47	58	7.9 (7.6)	15.2 (5.7)	0–25	5–25
Urticaria	12 (4/8)	4 (2/2)	37	38	6.4 (5.4)	8.3 (5.5)	1–18	1–13
Bullous disease	2 (1/1)	3 (1/2)	60	54	4.5 (4.9)	12.5 (4.9)	1–8	9–10
Erythroderma	5 (0/5)	2 (1/1)	45	72	4.0 (2.5)	6.5 (3.5)	1–7	4–9
Hyperhidrosis	6 (2/4)	–	35	–	9.0 (4.0)	–	3–14	–
Collagenosis	7 (3/4)	2 (0/2)	45	50	4.9 (5.0)	4.5 (6.4)	1–15	0–9
Pruritus	6 (2/4)	7 (2/5)	47	58	11.3 (8.0)	7.7 (5.2)	2–12	1–13
Acne	9 (5/4)	–	39	–	6.1 (4.7)	–	1–13	–
Viral warts	8 (6/2)	–	39	–	4.4 (0.9)	–	3–6	–
Miscellaneous	74 (27/47)	13 (4/9)	47	52	6.2 (5.3)	12.9 (7.4)	0–21	4–29
Overall	200 (74/126)	100 (36/64)	43	48	7.9 (6.9)	12.9 (7.0)	0–30	0–29
Healthy controls	100 (34/66)		41		0.4 (1.3)		0–11	

Translation

The DLQI was translated into Danish, using the translation–back translation method (12). It was first translated into Danish by two of the investigators and the two versions were compared and combined into one version. The Danish translation was then translated back into English by a person who was fluent in English and ignorant of the original English version. The latter translation was then compared with the original. Any discrepancies were noted, and adjustments of the wording of individual items were done accordingly. Eight dermatological patients from a private dermatology practice then completed this third version. After completing the questionnaire, the patients were interviewed with respect to the comprehensibility of the individual items and final adjustments were made.

Subjects

Two hundred patients (74 men, 126 women, aged 18–81 years, median 42 years) suffering from a range of dermatological diseases were recruited from the outpatient clinics of the dermatology departments of Bispebjerg and Gentofte Hospitals in Copenhagen and Marselisborg Hospital in Aarhus on the first day of referral. An additional 100 hospitalized dermatological patients (36 men, 64 women, aged 17–89 years, median 47 years) were recruited from Bispebjerg and Marselisborg hospitals. The patients were recruited consecutively over a period of approximately 12 months. A criterion for selection of outpatients was that they had not previously been treated at the department. The hospitalized patients were recruited on their admission day. The study was approved by the local ethics committees of Copenhagen and Aarhus counties.

The DLQI was also completed by 100 healthy volunteers obtained from the Danish Civil Registration System through the Central Office of Civil Registration (the CPR Office). The pool of volunteers was matched with the patient group for sex, age and county. The criteria for selection were that they should not have any skin problems or other systemic medical disease and should not have visited their GP during the previous 6 months.

Measurements

The patients were asked to supply information about their age, sex and the county of their permanent address and to estimate the duration of their disease in terms of the number of weeks, months or years. As a utility measure of QOL, i.e. a hypothetical value placed by patients on their health (2), the patients were also asked to rate how much time they would be willing to spend each day on an effective treatment of their disease (13). Time rating categories were 5, 10 and 30 min, 1, 2 and 3 h. They were then asked to complete the DLQI. The patients were then seen and diagnosed by a dermatologist. After seeing the patient, the dermatologist rated the severity of their skin symptoms on a 5-point scale, with scores of 1–5 corresponding to (1) "very slight symptoms", (2) "slight symptoms", (3) "moderate symptoms", (4) "pronounced symptoms" and (5) "very severe symptoms".

RESULTS

Sample characteristics

All patients agreed to participate. Diagnoses, age and gender of the 200 outpatients and 100 hospitalized patients are shown in Table I. Mean disease duration, median physician's severity ratings and the median time patients were willing to spend each day on an effective treatment of their disease are shown in Table II. No differences ($p > 0.05$) were found between hospital of recruitment in terms of age, disease duration, physician's severity ratings and the time patients were willing to spend each day on an effective treatment of their disease and the data were pooled for further analysis. Also, no differences were found between patients and healthy controls with respect to mean age and the distribution of men and women. Hospitalized patients were significantly older than outpatients (mean age: 48.0 years; SD = 19.2 years vs. mean age: 42.7; SD = 15.8 years; $p < 0.01$; t-test for independent samples) and had experienced disease for significantly longer than outpatients (mean duration: 164 months; SD = 180 months vs. mean duration: 79; SD = 106 months; $p < 0.001$). Hospitalized patients were willing to spend significantly greater time on an effective treatment than outpatients (median: 180 min; range: 10–180 min vs. median: 60; range 5–180 min; $p < 0.001$; Mann–Whitney test) and had significantly more severe disease ratings than outpatients (median: 4; range: 1–5 vs. median: 3; range 1–5; $p < 0.001$; Mann–Whitney test).

DLQI scores

Two hundred and eighty-six patients (95.3%) correctly completed all 10 items. Seven patients (2.3%) did not complete question 9 concerning sex life. The number of incomplete answers was evenly distributed among the

Table II. *Mean physician-rated disease severity, mean disease duration and median time willing to be spent on a hypothetical effective treatment for outpatients and hospitalized patients*

Diagnosis	Median severity ratings (range)		Mean disease duration (months) (± SD)		Median time (min/day) willing to be spent on an effective treatment (range)	
	Outpatients	Hospitalized	Outpatients	Hospitalized	Outpatients	Hospitalized
Psoriasis	3 (2–4)	4 (3–5)	167±150	222±197	60 (5–180)	120 (10–180)
Atopic eczema	3 (2–5)	4 (2–5)	226±144	211±137	90 (30–180)	180 (60–180)
Other eczema	3 (1–4)	4 (2–5)	58±81	138±174	45 (10–180)	180 (30–180)
Urticaria	4 (2–5)	3 (1–4)	26±82	75±94	30 (5–180)	45 (10–180)
Bullous disease	2 (1–3)	3 (3–4)	4±1	4±2	75 (30–120)	105 (30–180)
Erythroderma	3 (1–4)	3 (3–4)	58±102	7±2	60 (5–180)	120 (60–180)
Hyperhidrosis	4 (3–4)	–	133±82	–	60 (30–180)	–
Collagenosis	3 (2–4)	3 (3–4)	33±21	33±21	60 (10–180)	150 (120–180)
Pruritus	3 (3–4)	3 (2–4)	35±49	41±88	120 (10–180)	60 (30–180)
Acne	3 (2–4)	–	101±82	–	30 (10–180)	–
Viral warts	2 (2–4)	–	41±26	–	45 (10–120)	–
Miscellaneous	3 (1–4)	4 (3–5)	55±88	113±183	60 (5–180)	180 (30–180)
Overall	3 (1–5)	4 (1–5)	79±108	159±173	60 (5–180)	150 (10–180)

remaining 9 items. The mean total scores of the DLQI are shown in Table I. The mean scores of the 10 items were 23–54% higher in hospitalized patients compared with outpatients. Item 1 displayed the highest mean scores (hospitalized patients: 2.3; outpatients: 1.5; healthy controls: 0.2) and item 9 the lowest (0.8; 0.5; and 0.0, respectively). DLQI scores of men and women and of hospitalized patients, outpatients and healthy controls were compared with a two-way analysis of variance (ANOVA). Significant effects were found for both group [F (2,385) = 98.7; $p < 0.001$] and gender [F (1,385) = 11.4; $p < 0.001$], with group and gender explaining 40% of the variance in DLQI scores. Hospitalized patients had higher DLQI scores than both outpatients and healthy controls, outpatients had higher scores than healthy controls and women (10.9±7.4) scored higher than men (7.5±6.7). When comparing the scores of the individual items, hospitalized patients showed significantly higher scores than outpatients for all 10 items ($p < 0.05$; Mann–Whitney). Women had significantly ($p < 0.05$; Mann–Whitney) higher scores than men on all items except item 3 ("How much has your skin interfered with you going shopping or looking after your home or garden?") and 10 ("How much of a problem has the treatment for your skin been?").

Test–retest reliability and internal consistency

For the subsample of 26 patients who had completed the DLQI 7 days after the first test, the test–retest reliability was 0.93 ($p < 0.001$). The individual test–retest correlations of items 2–10 were all significant ($p < 0.01$), with coefficients ranging from 0.62 to 0.88. The test–retest correlation for item 1 of 0.32 ("How itchy, sore, painful or stingy has your skin been?") did not reach statistical significance. The internal consistency of the responses between items was tested by calculating the correlations between all items. The paired correlations ranged from 0.30 (questions 2 and 6) to 0.69 (questions 8 and 9), all statistically significant at the 0.001 level. The internal consistency coefficient (Cronbach's alpha) was 0.88.

Correlations

Significant, inverse correlations (Pearson's R) were found between age and DLQI scores for both outpatients ($R = -0.16$; $p < 0.05$) and hospitalized patients ($R = -0.22$; $p < 0.05$). The significant inverse correlations between age and DLQI persisted when controlling for severity and disease duration by calculating the partial correlations. Positive correlations were found between DLQI and disease duration for outpatients ($R = 0.30$; $p < 0.01$) and the sample as a whole ($R = 0.27$; $p < 0.01$), but not for the group of hospitalized patients ($R = 0.09$; $p =$ NS). The absence of a significant correlation persisted when controlling for age with a partial correlation. Significant rank order correlations ($p < 0.05$) were found between DLQI scores and physician's ratings of severity of skin symptoms for both outpatients and hospitalized patients and between DLQI scores and the time willing to be spent on an effective treatment for outpatients.

Influence of diagnosis

A one-way ANOVA showed a significant difference between diagnoses for age [F (11,288) = 6.2; $p < 0.01$], with atopic dermatitis patients being significantly younger than the patients in several other diagnostic categories. The mean DLQI scores for the different diagnoses were therefore compared with an analysis of covariance (ANCOVA), with diagnosis as a between- subjects factor and age entered as a covariate. The results showed a significant effect of diagnosis [F (11,287) = 6.1; $p < 0.001$]. Comparisons among diagnoses, controlling for multiple comparisons, showed that DLQI scores for atopic dermatitis patients were significantly higher ($p < 0.01$) than scores for patients with acne, viral warts, collagenosis, erythroderma, urticaria and other eczemas. Psoriasis patients had significantly higher DLQI scores ($p < 0.05$) than patients with collagenosis and the group of patients with other skin diseases.

Variables predicting DLQI scores

A multiple regression analysis was conducted with DLQI scores as the dependent variable and patient sample (outpatients and hospitalized), age (years), sex, disease duration (months) and severity as independent variables. Severity was dichotomized as high and low severity, with high severity corresponding to physician ratings from 4 to 5 (37.3% of patients) and low severity corresponding to ratings from 1 to 3 (62.7% of patients). The results showed a significant main effect [F (1,284) = 44.9; $p < 0.001$], as well as significant effects of severity (Beta = 0.28; t = 5.2; $p < 0.001$; $R^2 = 0.14$), patient group (Beta = 0.23; t = 4.2; $p < 0.001$; $R^2 = 0.06$), sex (Beta = −0.19; t = −3.6; $p < 0.001$; $R^2 = 0.05$), disease duration (Beta = 0.16; t = 3.0; $p < 0.003$; $R^2 = 0.02$) and age (Beta = −0.16; t = 2.2; $p < 0.05$; $R^2 = 0.01$), with the total model explaining 28% of the variance in DLQI scores. Higher DLQI scores were associated with greater severity, being hospitalized, being female, having longer disease duration and being younger.

DLQI as a predictor of time willing to be spent on treatment

Patient's ratings of the time they were willing to spend each day on an effective treatment were dichotomized into ≥ 30 min and < 30 min. A multiple logistic regression analysis was conducted with the dichotomized time rating variable as the dependent variable and DLQI scores, patient group (ambulatory, hospitalized), sex, age (years), disease duration (months) and severity (physician's ratings) as independent variables. The only significant predictors were DLQI scores (R = 0.13; $p < 0.01$), patient group (R = −0.12; $p < 0.05$) and sex (R = 0.09; $p < 0.05$), with higher DLQI scores, belonging to the group of outpatients and being female predicting willingness to spend > 30 min a day on an effective treatment.

DISCUSSION

In our study we included a sample of 200 dermatology outpatients, as was used in the preliminary validation of the original English version (7). To increase the representativeness of our sample, we included patients from three dermatology clinics in two Danish cities which were attended by patients from several counties. Furthermore we also included a sample of 100 dermatology patients hospitalized at two dermatology departments.

The mean DLQI total score of our outpatient sample of 7.9 was similar to the score of 7.3 found in the original English sample of outpatients, as were the mean scores and the inter-item correlations of the 10 individual items (7). Although the 10 items of the DLQI cover six different areas relevant to QOL, the relatively high inter-item correlations indicate that the total DLQI score represents a relatively internally consistent measure of QOL. This is also indicated by the high internal consistency coefficient of 0.88 found in our sample. Although somewhat smaller than the very high test–retest correlation of 0.99 found in the original English sample, the one-week test–retest correlation of 0.93 found in our sample suggests satisfactory stability of responses over time.

Hospitalized patients had significantly longer disease duration and significantly greater physician-rated disease severity than outpatients, and we therefore expected greater impairment of QOL in hospitalized patients than in outpatients. Hospitalized patients showed a similar score distribution, but exhibited significantly higher DLQI scores for all 10 items, indicating the expected greater impairment of QOL in hospitalized patients. The mean score of 12.9 on admission of hospitalized patients found in our study was similar to the mean score of 13.2 found for a sample of English hospitalized patients (13). As expected, healthy controls, matched for age, sex and county of residence, had significantly lower scores than both hospitalized patients and outpatients on all 10 items. While Finlay and Khan (7) were unable to find any differences in DLQI scores between men and women, we found that women scored significantly higher than men on all but two items. This finding could perhaps be explained by the association of the general female stereotype with a greater interest in appearances and a greater dependency on social relationships than men (14). When we compared the DLQI scores for the different diagnoses while controlling for age differences between diagnostic groups, we found that patients with atopic dermatitis and psoriasis exhibited the highest scores. Although the differences, probably due to the relatively small numbers of patients in most diagnostic groups, did not reach statistical significance for all diagnoses, our findings are in concordance with the results for the original English version of the DLQI.

When analysing the influence of all independent variables, the multiple regression analysis showed that greater disease severity, being hospitalized, being female, having longer disease duration and being younger were associated with greater impairment of QOL. Disease duration and age, however, only accounted for a few percent of the variation. The inverse association between DLQI scores and age suggests that the QOL of older patients is generally less affected by skin disease than the QOL of younger patients, an interpretation which seems intuitively reasonable, as older patients may be less interested in appearance and more confident in dealing with social relationships. The small influence of disease duration, which is primarily due to the lack of correlation in the sample of hospitalized patients, could be attributed to a "ceiling effect" of severity in hospitalized patients. Higher DLQI scores, belonging to the outpatient group, and being female emerged as the only significant predictors of the time patients were willing to spend on a hypothetical treatment that would clear their skin condition completely. This suggests a consistent association between the two disease-specific measures of QOL. No correlation was found between the time patients were willing to spend on a hypothetical treatment and DLQI scores in the sample of hospitalized patients, which perhaps reflects that patients with longer disease duration and greater disease severity are generally less optimistic about treatment possibilities.

Taken together, our results indicate that the emphasis Danish patients place on various aspects of disability covered by the questionnaire is similar to that of English patients. Ultimately, the validity of the Danish translation of DLQI can only be assessed by showing that the measure is sensitive to effects of treatment (8) and therefore further studies are warranted.

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