

Title: Impact of psoriasis on quality of life of children and their caregivers: an Italian experience

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In recent years there is an increasing interest in childhood psoriasis^{1,2}. In pediatric patients the impact of psoriasis on quality of life(QoL) is not limited to the patient himself, but inevitably also extends to the caregiver, by the chronic course of the disease^{3,4}.

The Children's Dermatology Life Quality Index (CDLQI) was developed to measure the impact of any skin disease on QoL in children⁵ while The Family Dermatology Life Quality Index and Psoriasis Family Index(PFI-14) were developed to measure the "secondary impact" of psoriasis on the caregivers^{6,7}.

The aim of this study was to investigate the impact of psoriasis on QoL in Italian children and their caregivers and to correlate demographic, clinical and therapeutic features with QoL.

Patients and caregivers were consecutively recruited in dermatology pediatric unit of Bologna from December 2018 to September 2020. Inclusion criteria were: (i)diagnosis of psoriasis in a child aged from 4 to 16 years; (ii)written consent form from at least one parent. Exclusion criteria were:(i)poor understanding of the Italian language, (ii)children with other systemic or inflammatory dermatological condition.

During the visit, were collected information about age, gender, age at the onset of the disease, family history, type of psoriasis, involved areas, severity of the disease (Psoriasis Area and Severity Index-PASI, Body Surface Area-BSA) and the impact on QoL by CDLQI. PASI was always rated by the same investigator (MAC-coauthor,dermatologist). Caregivers completed the PFI-14 questionnaire.

Patients were also classified into two groups according to treatment status (topical versus systemic agents). The study protocol was approved by the Local Research Ethic Committee of Bologna, Italy. Statistical analyses were conducted using SPSS Statistics Version 25.0. All tests were two-tailed, and the significance level was set at $p < 0.05$.

Fifty patients and caregivers met the inclusion criteria and completed CDLQI and PFI-14 (Table 1). Thirty percent of patients were males, the mean age was 10.7 ± 3.6 years, the mean age at onset of psoriasis was 6.6 ± 2.8 years and the mean of psoriasis duration in our sample was 4 ± 2.9 years. There

were 44 patients(88%) with topic therapy, and 6(12%) with systemic therapy. Mean PASI score was 3.6 ± 2.6 (median=3) and mean BSA score was $2.6\pm 2.4\%$ (median=1); 96% had BSA and/or PASI below 10, that denotes mild psoriasis according to the rule of tens⁸. Mean CDLQI score was 7.5 ± 4.0 points(median=5).

According to CDLQI scores, in 2.0% of patients, psoriasis had no effect on their quality of life, in 60.0% a small effect, in 26.0% a moderate, effect, in 12.0% a very large effect.

Concerning caregivers, mean age was 37.7 ± 7.2 , 48 were the mother of the patient and 2 were the father, and 14 caregivers were single parents (28%). The mean PFI-14 score was 11.2 ± 6.9 points (median=9).

The total CDLQI score was significantly and moderately correlated with PASI (**figure 1a**) but not with patient age, sex, BSA, family history, alone child, type of psoriasis, disease duration, or age at disease onset.

Furthermore, there was a significant but weak correlation between CDLQI and PFI-14 (**figure 1b**).

The multiple linear regression model showed a positive and significant relation of CDLQI score with PFI-14 score ($\beta=0.722$; $p=0.012$), while PASI and BSA score had no significant effect on PFI-14 (**figure 1 c**).

Moreover, patients treated with topical agents had significantly lower CDLQI scores compared to those treated with systemic agents (**figure 1d**). The PFI-14 scores distribution was similar between the two groups.

The impact of many skin diseases is not limited to the patient but may extend to the rest of the family.

In our series the mother plays a central role in the care of children in 96% of cases. These findings are not surprising in Italian population where mothers spent more time with children than fathers.

Our study shows that impact of psoriasis on caregiver is significantly correlated with the children's QoL but not with PASI and BSA^{4,6,7}.

Noteworthy, 98% of pediatric patients reported that psoriasis has an effect on their life. The significant correlation between PASI and CLDQI are in accordance with results found in a recent metanalysis and Turkish study^{9,10}.

PASI and BSA scores were unrelated with PFI-14 score, suggesting that patient QoL influences PFI-14 independently of disease severity. This finding confirming that QoL is a complex concept, with disease severity being merely one contributing factor^{6,9}. In this point of view dermatologists should address caregiver QoL in an integrated approach offering psychological support.

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Figure 1. (a) Scatterplot showing the relationship between CDLQI and PASI scores (Spearman coefficient $\rho=0.471$; $p<0.001$; $n = 50$); on the contrary CDLQI was not correlated with patient age, sex, BSA, family history, alone child, type of psoriasis, disease duration, or age at disease onset. **(b)** Scatterplot showing the relationship between Child Dermatology Life Quality Index (CDLQI) and PFI-14 scores (Spearman coefficient $\rho=0.363$; $p=0.01$; $n = 50$). **(c)** Multiple linear regression model on PFI-14 total score. Adjusted $R^2=0.171$, $F=4.370$, $p=0.009$. **(d)** Patients treated with topical agents had significantly lower CDLQI scores (median 5, IQR [4-7]) compared to those treated with systemic agents (median 12, IQR [8-15]) (Mann-Whitney U test=229.5, $p=0.002$), in particular in the subscale Treatment (Mann-Whitney U test=214; $p=0.012$).

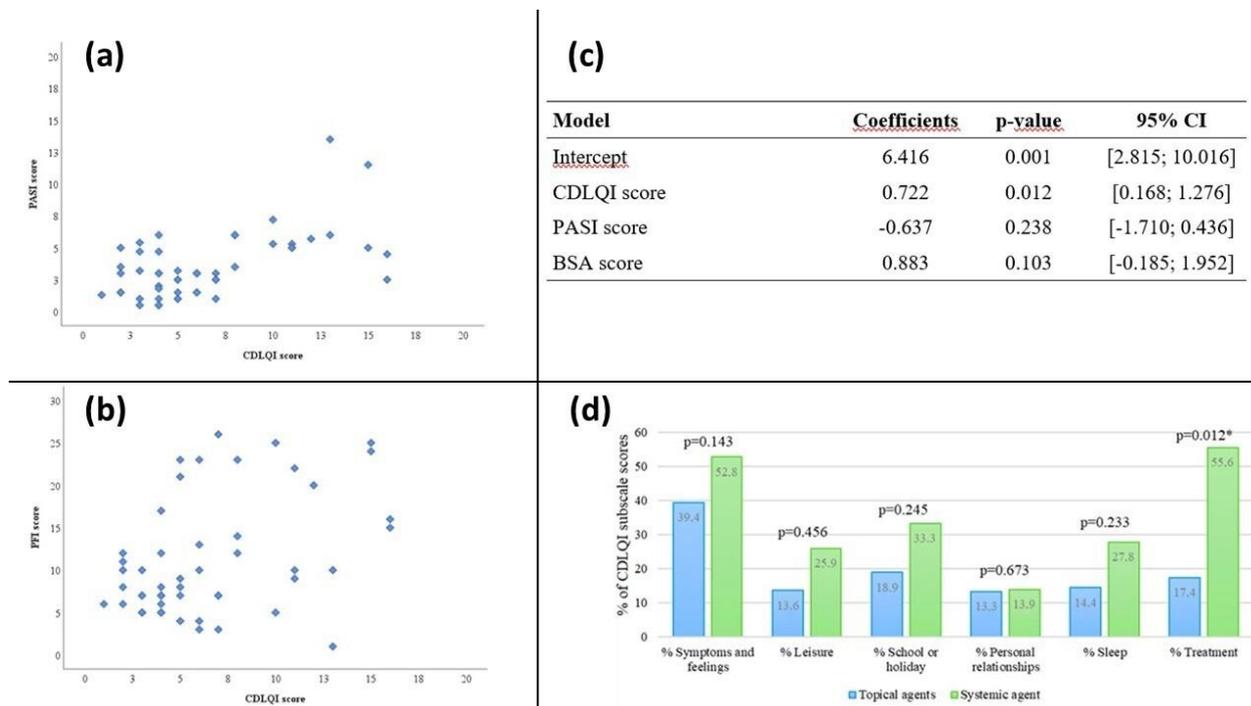


TABLE 1. Multiple linear regression model on PFI-14 total score. Adjusted $R^2=0.171$, $F=4.370$, $p=0.009$.

| Model | Coefficients | p-value | 95% CI |
|-------------|--------------|---------|-----------------|
| Intercept | 6.416 | 0.001 | [2.815; 10.016] |
| CDLQI score | 0.722 | 0.012 | [0.168; 1.276] |
| PASI score | -0.637 | 0.238 | [-1.710; 0.436] |

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|-----------|-------|-------|-----------------|
| BSA score | 0.883 | 0.103 | [-0.185; 1.952] |
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