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Quality of life, age and disease severity in children affected by atopic dermatitis and their families.

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Quality of life in atopic dermatitis.

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Abstract

Introduction: Atopic dermatitis (AD) is one of the most common chronic inflammatory skin diseases occurring during childhood. The study aimed to investigate the impact of AD on health-related quality of life (HRQoL) in an Italian sample of children (0-12 years old) and their families.

Methods: during a routine check-up, 60 AD children and 60 caregivers completed the Infants Dermatitis Quality of Life Index, Children's Dermatology Life Quality Index, Dermatitis Family Impact Scale and KINDL-R Questionnaire. The physician completed the SCORAD Index.

Results: 10% of children and 13.3% of parents showed a low HRQoL associated with AD. A more severe skin condition was associated with a poorer quality of life for both the children ($F=7.06$, $p=0.001$) and their parents ($F=11.2$, $p=0.001$). Regression analyses indicated that the best predictors for HRQoL were disease severity for children and disease severity and children's age for parents. Objective and total SCORAD Indices showed to correlate with different HRQoL dimensions.

Conclusions: younger children and worse skin conditions may represent important predictors for assessing the impact of AD on family wellbeing.

Key-words: atopic dermatitis, health-related quality of life, disease severity, family assessment, skin condition.

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Introduction

Atopic dermatitis (AD), also known as atopic eczema, is one of the most common chronic inflammatory skin disease which occurs during childhood, affecting 10-20% of children in Europe, depending on the Country being studied [1], and 17% of children in the United States [2]. Time trends in atopy, as well as in other immunologic or allergic diseases have shown a substantial increase since the early 1960s and there is evidence of consistent associations of these disorders with a Western lifestyle [3]. The estimate point prevalence is 1-10% and, even though the disease tends to improve in adulthood, at this age the prevalence still remains at least 1-3%. In a recent study by Girolomoni et al. (2003), results indicated that AD has an estimated point prevalence of 5.8% in Italian schoolchildren [4]. Usually children show atopic symptoms in the first five years of life, with about 60% of cases appearing within the first year and with the onset usually occurring between 0 and 6 months [5]. This early period is obviously quite critical for a child's development and might influence future psychical, psychological, social and communicative patterns. Children affected by a severe and disabling AD might experience distress and helplessness, irritability, fussiness and increased crying, and this may cause major difficulties and problems in the young patient and in his entire family [6]. Behavioural problems have also been found in AD children; these include hyperactivity and restlessness, difficulties with discipline, and disruptive actions to gain parental attention [7-8]. Severe levels of AD are associated with grave sleep dysfunctions: children affected with AD tend to associate their sleep and rest with itching and often show abnormal awakening-sleeping patterns, which can last over time and lead to chronic abnormal sleep behaviour [10, 11, 12]. Mood changes and difficulties in feeding, dressing and bathing are other problems encountered in AD children [13].

Skin diseases affect patients' health-related quality of life (HRQoL) but also that of their families [16]. Parents with AD children might experience concerns and fears about the disease, its consequences and its treatments [17], sadness, crying, guilt, self-blame, frustration, arguments and tension with the caregiver's spouse, shame and embarrassment in social situations when with the AD child, anger or disappointment for the skin condition [7, 18, 19, 20, 21].

Health-related quality of life measurement is important in determining the impact a disease has on the person's ability to live a fulfilling life [22]. It can complement clinical measures of disease status, because traditional clinical measures, such as SCORAD [23] (a specific index assessing the disease severity level of the AD, across objective assessment and subjective evaluation of the condition), level of pruritus, or objective condition of skin, are important but they may not capture the broader impact of the disease.

Aims of the study

The aims of this study were to investigate the impact of atopic dermatitis on the quality of life and wellbeing of an Italian sample of AD children and their families, analyzing the possible association between different levels of disease severity, age, clinical and socio-demographic variables and quality of life. Since all the analyses concerning the severity of the condition were conducted using both objective and total SCORAD, the current study also aimed to investigate to what extent these two values corresponded with HRQoL measures.

Methods

Participants

All consecutive AD patients, aged 0-12 years, with a confirmed diagnosis of atopic dermatitis, and their families, attending the Dermatology Unit of M. Bufalini Hospital, Cesena (Italy), were considered eligible for the study. During the period March 2006 – March 2007, 60 AD children and their families (60 adults) were recruited. Patients were enrolled in the study during a routine check-up in Day-Hospital (DH), and the diagnosis of AD was carried out by a physician who completed the SCORAD, following the diagnostic criteria proposed by Hanifin et al. [24]. All participants gave written consent to take part in the study. Ethical approval was obtained to conduct the research.

Measures

The measures used in the study were:

- The Infants Dermatitis Quality of Life Index (IDQoL), a disease-specific measure for AD children aged 0-4 years [25], consisting of 10 items concerning physical and social functioning and completed by the caregiver; higher scores represent a poorer quality of life.
- The Children's Dermatology Life Quality Index (CDLQI), a skin-related measure for children aged 5-16 years [26] consisting of 10 items concerning physical and social functioning; higher scores represent a poorer quality of life.
- The Dermatitis Family Impact (DFI) questionnaire, a 10-item scale measuring the impact of AD on families with a child affected by the disease [27]; responses to the questionnaire, completed by caregivers range from 0 to 30, where, again, the higher the scores the poorer the quality of life.
- The KINDL-R Questionnaire – atopic dermatitis module (versions: 5-7 years old, 8-12 years old) [28], a disease-specific measure for children with atopic dermatitis and their families. This measure investigates the total HRQoL and a number of dimensions, such as physical wellbeing, emotional wellbeing, self-esteem, family, friendships/relationships, school, and perception of the disease, which both the child and the caregiver have to evaluate separately. Higher scores represent a better quality of life.
- The SCORAD, an index aimed at assessing AD disease severity which provides two different values: a) the objective SCORAD, including extent and intensity of the lesions, divided into three levels: <15 mild, 15-40 moderate, >40 severe, and b) the total SCORAD, where the objective index is merged with a caregiver's assessment of the severity (concerning pruritus and sleep loss), with ranges of <35 mild, 35-60 moderate, and >60 severe [23]; in both indices the higher the value the worse the skin condition. Given that in literature [29] it has been demonstrated that subjective symptoms do not always correlate with disease severity and objective assessment, both values have been considered in the study.

Procedures

Participants were given a copy of all the questionnaires included in the study, according to the child's age. All parents of AD children aged 0-4 years completed the DFI and the IDQoL. All parents of AD children aged > 4 years completed the DFI and the KINDL-R parents-version, while their children completed the CDLQI and the KINDL-R children's -version.

Statistical analysis

Kolmogorov-Smirnov Test confirmed the normal distribution of the data, allowing the use of parametric statistics.

Disease severity groups were defined as a function of the two SCORAD indices (objective and total) and divided into three categories (mild, moderate, severe) as well as into age groups (0-4 yrs, 5-7 yrs, 8-12 yrs). Differences between HRQoL scores for age groups and for disease severity groups were thus analysed using a factorial analysis of variance (ANOVA). Post hoc analyses were applied using Tukeys Honestly Significant Difference (HSD) test.

Relationships between HRQoL scores, disease severity, age and clinical and socio-economic variables were analysed using Pearson product moment correlations and Kendall correlations. Since one of the aims of the study was to investigate the possible associations between clinical variables, disease severity and HRQoL, the main method of analysis in the study was multiple regression.

Statistical analyses were conducted using SPSS package for Windows (version 13.0).

Results

Descriptive Statistics

120 subjects (60 AD children and 60 parents) completed the questionnaires. The 60 AD children (mean age=4.51 years old, sd=3.3, range=0-12 yrs) comprised 30 females and 30 males, divided into three age levels: 0-4 yrs (61.7%), 5-7 yrs (20%), 8-12 yrs (18.3%). According to the objective SCORAD Index, 27.8%(N=15) showed a mild AD, 48.1%(N=26) a moderate AD and 24.1%(N=13) a severe AD, while, according to the total SCORAD index, 59.6%(N=34) showed a mild AD, 34.6%(N=21) a moderate AD and 5.8%(N=5) a severe AD (Table 1).

The 60 parents (mean age=36.5 years old, sd=5.8, range=25-50 yrs) comprised 54 females (90%) and 6 males (10%); 8.3%(N=4) were single, 89.6%(N=43) married and 2.1%(N=1) divorced. According to Hollingshead categories for socioeconomic status [43], subjects were classed as belonging to one of three levels: low (27.1%), medium (60.4%), and high (12.5%).

In the total sample, 10% of children resulted as having a low QoL score (IDQoL/CDLQI score > 15), while 13.3% of parents were found to be at risk in terms of decreased quality of life (DFI score > 15) (see Figure 1 and Figure 2). Using Pearson Chi Square Analysis, no significant differences were found for the percentage of risk of low quality of life in children across the three severity levels ($\chi^2=2.17$, df=2, p=0.336), while parents whose children had severe AD resulted as being at greater risk for low QoL ($\chi^2=7.59$, df=2, p=0.022; 38.5% severe vs 7.7% moderate and 6.7% mild). Significant associations were not found either for children or for parents in the distribution across age levels.

Disease severity, age groups and quality of life

To explore the relationship and the effect of the interaction of the variables 'disease severity level' (measured using objective and total SCORAD) and 'age group' with HRQoL (Table 2), a multivariate ANOVA was conducted.

Considering disease severity level, the objective SCORAD level resulted to explain the children's quality of life scores by differentiating between AD patients with different skin conditions (F=4.11, p=2, p=0.023), where worse results of the SCORAD corresponded to poorer results in the QoL. Also, considering the scores obtained by the DFI, objective SCORAD could differentiate between parents of AD patients with either a mild, moderate or severe skin condition (F=9.026, df=2, p=0.001) (Figure 3). In particular, after using Tukey's HSD post-hoc test, children with mild AD resulted as having a better quality of life than children with a severe AD (p=0.001). Parents with a child affected by a mild AD were found to have a better quality of life when compared to parents whose child had either a moderate (p=0.015) or severe (p<0.001) atopic eczema, and parents of children affected by a moderate AD reported a better QoL than parents of children showing a

severe AD ($p=0.013$). Moreover, both children and parents belonging to the severe AD group reported a lower level of emotional functioning ($p=0.04$), as assessed by the KINDL-R.

No differences in HRQoL scores were found among disease severity groups when using the values obtained by the total SCORAD (objective symptoms and subjective evaluation), even though, again, a trend appeared ($F=2.82$, $df=2$, $p=0.06$), in which parents whose child had a mild AD reported a better quality of life than all the other parents (moderate: $p=0.075$; severe: $p=0.063$).

As with the objective SCORAD, only KINDL-R emotional functioning showed a worse score for children in the severe AD group ($F=5.09$, $df=2$, $p=0.025$).

As far as the variable 'age group' was concerned, neither children's nor parents' HRQoL scores resulted as being significantly different, depending on the group being considered and analyzed with both objective and total SCORAD.

Finally, No main effects of the interaction between age and disease severity (objective and total SCORAD) were found.

Associations between clinical status and HRQoL measures

For the purpose of this study, all clinical, socio-demographic and medical variables have been taken in consideration, in order not to exclude any important aspect which might influence AD patients' quality of life and wellbeing (see Table 3 for correlation coefficients). There was a very strong correlation between objective SCORAD and total SCORAD (Pearson $r=0.982$, $p<0.0001$); suggesting that they probably focus on similar dimensions. Moreover, both objective SCORAD and total SCORAD were found to be moderately to strongly correlated to the HRQoL measures, almost in the same way: objective SCORAD x IDQoL/CDLQI (Pearson $r=0.394$, $p=0.003$), objective SCORAD x DFI (Pearson $r=0.458$, $p<0.0001$), total SCORAD x IDQoL/CDLQI (Pearson $r=0.379$, $p=0.005$), total SCORAD x DFI (Pearson $r=0.451$, $p=0.001$). However, it is important to underline the fact that the objective SCORAD was shown to correlate with both the physical and emotional dimensions of the KINDL-R (Pearson $r=0.545$, $p=0.03$; Pearson $r=0.552$, $p=0.03$), while the total SCORAD, which included a subjective evaluation, was more likely to correlate with the emotional aspects (Pearson $r=0.572$, $p=0.02$) and did not show any association with the physical wellbeing

score. So, even though the two indices correlate, they probably give a different perception of the skin disease.

IDQoL/CDLQI scores and DFI scores were found to be strongly correlated (Pearson $r=0.755$, $p<0.0001$), confirming that the skin condition seemed to affect the whole family system and not only the young AD patients. None of the HRQoL questionnaires, however, appeared to be associated with the KINDL-R dimensions. KINDL-R dimensions were found to be inter-correlated with other KINDL-R dimensions: the children's total score appeared to be strongly correlated with the caregivers' total score (Pearson $r=0.769$, $p=0.009$) and with the friendship/relationship score ((Pearson $r =0.885$, $p=0.001$). The scores concerning the child's self-esteem resulted as strongly correlated with the dimensions regarding family functioning ((Pearson $r =0.890$, $p=0.001$) and with friendship/relationship functioning ((Pearson $r =0.706$, $p=0.023$).

Other variables were shown to be associated: the presence of other diseases or conditions (not necessarily related to the skin) was found to be negatively correlated to both the IDQoL/CDLQI scores (Kendall tau $=-0.360$, $p=0.022$) and the objective SCORAD (Kendall tau $= -0.378$, $p=0.017$).

Regression analyses between potential explanatory variables and HRQoL

Multiple regression analyses with stepwise method were conducted in order to verify how much each variable contributed to an explanation of the HRQoL scores found in our sample.

A regression equation was thus created for each HRQoL measure, leading to two main models. As far as IDQoL/CDLQI scores were concerned, all the following variables were included: children's age, disease severity, children's gender, caregiver's gender, caregiver's family status (married or divorced), presence of other conditions besides AD and socio-economic level of family. Indeed, only a small, non-significant proportion of the variability in HRQoL scores was explained by the set of clinical variables. Using the stepwise method, a significant model emerged ($F=9.20$, $p=0.001$), explaining 34.6% of the variance (Adjusted $R^2=0.346$). Objective SCORAD (Beta coefficient= 0.905 , $p<0.0001$) and total SCORAD (Beta coefficient= -0.503 , $p<0.030$) were found to be the significant variables. Even though the objective SCORAD seemed to be the strongest predictor for the IDQoL/CDLQI scores, the inclusion of the total SCORAD, which contained a

subjective perception of the condition, in the second model resulted in an additional 9% of variance being explained. All the remaining variables were excluded from the model because of their weak significance.

As far as DFI scores were concerned, the same variables included in the IDQoL/CDLQI analysis were included. Using the stepwise method, a final significant model emerged ($F=22.14$, $p<0.0001$), explaining 57.7% of variance ($R^2=0.577$). The model that best explained the quality of life assessed with the DFI (in terms of adjusted R^2) was the one involving both disease severity level (i.e. objective SCORAD) and age group, which respectively showed Beta coefficient=0.727 ($p<0.0001$) and Beta coefficient=-0.277 ($p=0.024$). The inclusion of the variables concerning children's age explained almost another 7% of the variance (R^2 change=0.077). Children's and caregiver's gender, family status, presence of other conditions besides AD and socio-economic level of family, although relevant for AD patients' perception of their life, did not result as being significant predictors for the health-related quality of life scores.

Discussion

The current study suggested that there might be a strong impact of this skin condition on patients' HRQoL. If considering the whole sample, children with a severe AD and their parents resulted as having a poorer quality of life, as measured by IDQOL/CDLQI and DFI. The outcomes confirmed a very strong trend which is shown for both the children and the caregivers.

Most of the variables considered in the study resulted as being interrelated. This is not surprising, as the majority of them would be expected to play an important role in the adjustment to the skin condition and in the perception of health status. The several correlations in our data highlighted the global impact that the skin disease is shown to have on the AD family's HRQoL; these correlations also confirmed that the worse SCORAD levels, if assessed with the objective SCORAD, were associated not only with a worse HRQoL but also with worse perceived physical and emotional wellbeing, as assessed by the KINDL-R Scale. It is important to underline that HRQoL measures and KINDL-R did not show any significant correlations; apparently, they seemed either to measure

different constructs or to indicate a need for further studies, so as to better understand the possible associations among these dimensions.

The regression analyses clearly gave another confirmation to the importance of disease severity as important parameter and added some more information regarding age level [6,19]. In both models, it was clear that disease severity played a main role in influencing AD patients' HRQoL. However, even though disease severity explains a large part of the variance, the child's age accounts for another part of the family's QoL. This finding is confirmed in literature: AD has been shown to improve in adolescence and in many cases to disappear within the fifth year of life [31]. Notwithstanding this, there is another not-so-small portion of the variance that still needs to be accounted for. Considering the small sample size, other analyses should be conducted on a larger group of AD patients and AD families.

It is necessary to underline the caution with which the Beta estimates should be interpreted, in both the regression analyses, especially because of the interrelations between some of the considered variables. It is obvious that a major change in family status (eg. a divorce or a stressful event) or in the family's socio-economic level, which might cause an impairment in the caregiver's wellbeing, would probably be accompanied by a series of other difficulties that are likely to affect the children's and family's perceived quality of life.

Another important issue, which came to light in the current study, concerned the SCORAD index, which apparently does not always correlate with HRQoL measures or reflect the skin condition. Considering both the objective and the total SCORAD indices, we must take into account some important differences: firstly, the objective SCORAD seemed to be more able to predict quality of life, and was more greatly associated with physical functioning, than the total SCORAD. As a matter of fact, total SCORAD resulted as being correlated with emotional functioning and with the results from HRQoL questionnaires, but was not found to be related to the physical dimensions. The objective measure resulted as being more correlated to the actual condition and more able to discriminate between patients at different levels of severity, while total SCORAD results, although associated with disease severity, might be weaker in precision and reliability regarding physical status, because they include a subjective perception and, for this reason, a possible bias which

sometimes might mediate between the disease and how the patient and the family feel. Globally, these results add new information to the findings by Hon et al. [29] and open other questions about the usefulness of the SCORAD indices in being correlated to quality of life.

Understanding HRQoL in people with AD and exploring the impact of the disease on the patient and his family might help professional operators to relate better to patients and carers and facilitate the management of treatment regimens. Early research tended to focus on demographic and clinical variables but recent work has demonstrated that there are multiple factors which determine adherence, such as personal perception of health status, coping style, worries, burden, social reasons, motivation and side effects of treatments [32, 33].

HRQoL in atopic dermatitis needs further investigation, not only regarding the young AD patient but also his whole family system.

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Fig.1 - Risk of low QoL in AD children across SCORAD levels

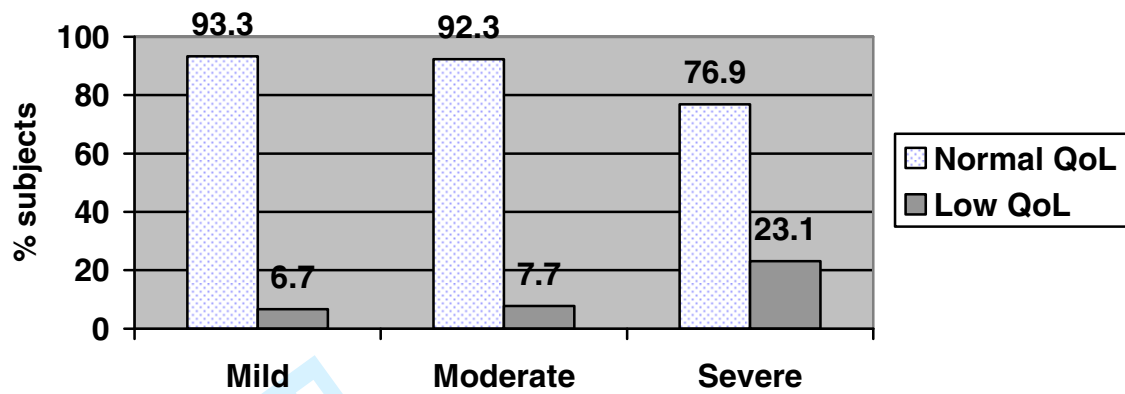


Fig. 1 – Children’s health related quality of life as assessed by IDQoL/CDLQI across the three objective SCORAD levels and risk of low QoL.

Risk of low QoL in AD caregivers across SCORAD levels

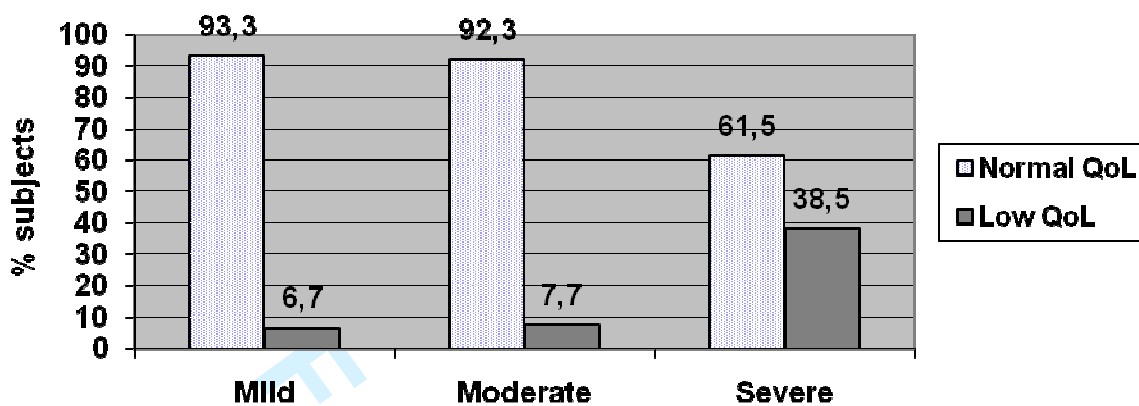


Fig. 2 – Parents' health related quality of life as assessed by DFI across the three objective SCORAD levels and risk of low QoL.

Fig.3 - Children's and caregivers' HRQoL

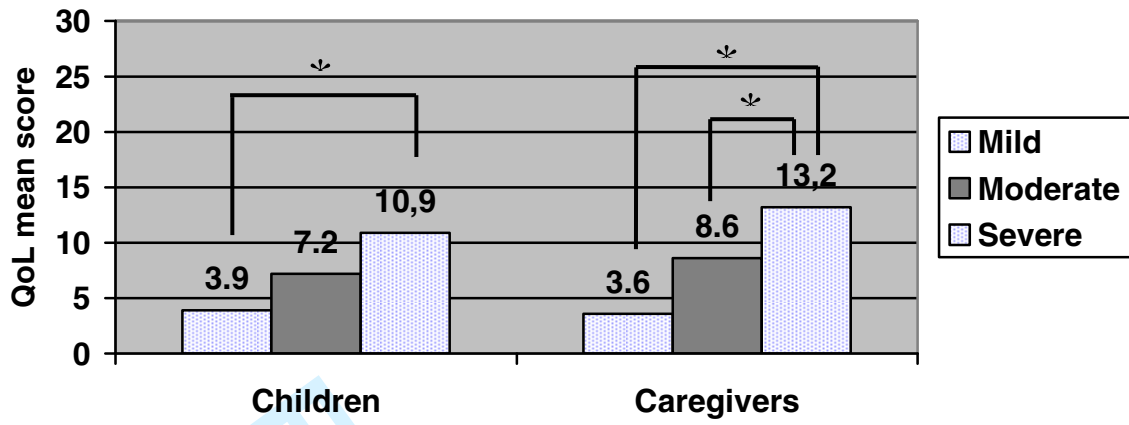


Table 1. Descriptive characteristics : frequencies and mean (sd) for SCORAD indices.

	severity	SCORAD obj	SCORAD tot
Children	<i>Mild</i>	27.8%	59.6%
	<i>Moderate</i>	48.1%	34.6%
	<i>Severe</i>	24.1%	5.8%
	Mean (sd) score	28.9 (15.5)	34.0 (19.4)

For Peer Review

Table 3. Table of correlations.

Pearson's Correlation	<i>SCORAD obj</i>	<i>SCORAD tot</i>	<i>IDLQI / CDQLI</i>	<i>DFI</i>	<i>KINDL-R physic</i>	<i>KINDL-R emot</i>	<i>KINDL-R child</i>	<i>KINDL-R parents</i>
<i>SCORAD obj</i>	1	r=0.982 p<0.001	r=0.394 p=0.003	r=0.458 p<0.0001	r=0.545 p=0.03	r=0.552 p=0.03	n.s.	n.s.
<i>SCORAD tot</i>	r=0.982 p<0.001	1	r=0.379 p=0.005	r=0.451 p=0.0001	n.s.	r=0.572 p=0.02	n.s.	n.s.
<i>IDLQI / CDQLI</i>	r=0.394 p=0.003	r=0.379 p=0.005	1	r=0.755 p<0.0001	n.s.	n.s.	n.s.	n.s.
<i>DFI</i>	r=0.458 p<0.0001	r=0.451 p=0.0001	r=0.755 p<0.0001	1	n.s.	n.s.	n.s.	n.s.
<i>KINDL-R physicl</i>	r=0.545 p=0.03	n.s.	n.s.	n.s.	1	n.s.	n.s.	n.s.
<i>KINDL-R emot</i>	r=0.552 p=0.03	r=0.572 p=0.02	n.s.	n.s.	n.s.	1	n.s.	n.s.
<i>KINDL-R child</i>	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	1	r=0.769 p=0.009
<i>KINDL-R parents</i>	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	r=0.769 p=0.009	1

Table 2. Mean (SD) scores categorized by children's age and objective SCORAD.

Measures	N	Child's Age	Mild (N=17)	Moderate (N=29)	Severe (N=14)	Total
<i>IDLQI / CDQLI</i>	37	<i>0-4 y</i>	4.8 (4.7)	7.4 (4.2)	12.1(3.7)	<i>8.00 (4.9)</i>
	12	<i>5-7 y</i>	2.3 (2.5)	8.2 (3.7)	9.0 (0.2)	<i>6.33 (4.1)</i>
	11	<i>8-12 y</i>	2.3 (2.3)	5.6 (7.7)	7.6 (9.0)	<i>5.27 (6.7)</i>
	60	<i>Total</i>	<i>3.6 (4.0)</i>	<i>7.2 (4.8)</i>	<i>10.8 (5.2)</i>	<i>7.00 (5.2)</i>
<i>DFI</i>	37	<i>0-4 y</i>	5.3 (6.0)	10.1 (5.6)	13.7 (5.3)	<i>9.85 (6.3)</i>
	12	<i>5-7 y</i>	0.6 (1.1)	7.6 (4.6)	16.0 (0.2)	<i>6.22 (5.9)</i>
	11	<i>8-12 y</i>	1.3 (1.5)	4.8 (4.5)	10.3 (6.3)	<i>5.36 (5.4)</i>
	60	<i>Total</i>	<i>3.6 (5.1)</i>	<i>8.6 (5.4)</i>	<i>13.1 (5.3)</i>	<i>7.95 (6.2)</i>
<i>Total KINDL-R</i>	0	<i>0-4 y</i>	<i>///</i>	<i>///</i>	<i>///</i>	<i>///</i>
	12	<i>5-7 y</i>	79.0 (9.0)	79.0 (13.2)	<i>///</i>	<i>79.02 (10.7)</i>
	11	<i>8-12 y</i>	47.1 (5.3)	36.7 (4.3)	<i>///</i>	<i>41.99 (13.3)</i>
	23	<i>Total</i>	<i>58.5 (23.3)</i>	<i>55.5 (23.9)</i>	<i>///</i>	<i>57.24 (21.4)</i>