Health Science Monitor
2024; 3(1): 60-68

Original Article

Relationship between quality of life and disease severity of children with atopic dermatitis

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Abstract

Background & Aims**:** Atopic dermatitis (AD) has a detrimental impact on the quality of life (QoL) for both patients and their families. Our investigation delved into the correlation between the severity of the disease and the QoL experienced by individuals with AD.

Materials & Methods**:** This cross-sectional descriptive-analytical study included AD children, between 0 to 16 years of age, along with their parents. The influence of childhood AD on parents' QoL was studied using several questionnaires, which measures four areas of physical health, mental health, social relations, and environmental health.

Results**:** Of 100 AD children, 52% were boys and 48% were girls with a mean age of 5.96 ± 4.72 years. Ninety percent of children had moderate AD. The mean score of QoL for children aged 5-16 years (CDQOL questionnaire) was 17.51, and for children aged 0-4 years (IDQOL questionnaire) was 15.80. The mean score of parents' QoL, according to the FDLQI questionnaire, was 13.90, and according to the DFI questionnaire, it was 6.39. The mean scores of health and QoL in four areas of physical health, mental health, social relations, and environmental health were 20.79, 17.75, 9.72, and 25.9, respectively. There was a significant correlation between disease severity and scores obtained from CDQOL and IDQOL questionnaires ($p < 0.001$).

Conclusion**:** Childhood AD had a greater impact on QoL of parents in the areas of social relationships and psychological well-being. The influence of AD on the QoL of family members is significant, and this should be taken into account in the therapeutic process.

Keywords**:** Atopic dermatitis, Children, Disease severity, Quality of life

Received 22 April 2023; accepted for publication 18 November 2023

Introduction

Atopic dermatitis (AD) is a chronic inflammatory skin condition that is characterized by dry, scaly, and itchy skin, affecting an estimated 10-20% of children and 1-3% of adults (1). AD typically develops in the first year of life (2) and is often associated with other atopic conditions, such as asthma and allergic rhinitis (3). Although AD does not pose a direct threat to life, it can significantly impact the individual's quality of life (QoL), leading to social isolation and psychological problems (5).

QoL is widely acknowledged in assessing the impact of a disease or disorder on an individual's daily functioning (6). Individuals with AD, encompassing both adults and children, commonly report lower health-related quality of life (HRQOL) compared to the general population, and they also experience heightened psychological stress (7). The decline in HRQOL has been observed to correlate with the severity of the disease, irrespective of lesion location (8). Children affected by AD often display behavioral challenges such as increased dependency, fear, decreased participation in sports (which can affect their social life), and sleep disturbances leading to daytime sleepiness and academic difficulties (9, 10). Moreover, research indicates that children with infantile eczema face an escalated risk of developing hyperactivity and attention-deficit disorders by the age of 10 (11).

The impact of AD severity, particularly moderate and severe forms, primarily influences QoL, as opposed to mild forms (12). Given the escalating prevalence of AD, timely recognition of its manifestations and implementation of therapeutic interventions are crucial in mitigating the consequences of the disease (12). In more severe instances, AD poses challenges for the entire family, although some indications of improvement in this aspect have been noted (13). Numerous studies have consistently demonstrated a significant reduction in QoL among AD patients compared to both the general population and individuals with other dermatological or systemic conditions (14). However, limited research has been conducted to explore how a child's illness affects other family members. Thus, this study aims to assess the QoL of pediatric AD patients and their families, while establishing correlations between disease severity scales.

Materials & Methods

The study was approved by the Ethics Committee of Urmia University of Medical Sciences with code: IR.UMSU.REC.1400.173. This cross-sectional descriptive-analytical study included all atopic dermatitis children and their parents who referred to allergy and immunology clinics in Urmia, Iran, from September 2019 to March 2021. The patients were divided into two groups according to their age: 0 to 4 years and 5 to16 years.

The eligibility criteria encompassed individuals ranging from 0 to 16 years of age who exhibited distinctive dermatological lesions associated with AD at the commencement of the study. The primary diagnostic criterion for AD was the presence of pruritus (itching), while supplementary minor criteria included a history of flexural lesions in specific areas such as the elbow, popliteal fossa, perimaleolar region, and laterocervical region. Other minor criteria encompassed a personal medical history of asthma or rhinitis (or a family history of atopic disease in first-degree relatives for children under 4 years old), a history of dry skin within the previous year, symptom onset prior to the age of 2 (excluding children under 4 years old), and the presence of lesions affecting flexural areas or, for children under 4 years old, lesions on the forehead and cheeks. In order to receive a diagnosis of AD, patients were required to fulfill the major criterion and three or more minor criteria. Exclusion criteria consisted of patients with acute infectious diseases, autoimmune diseases, cutaneous manifestations associated with other conditions such as psoriasis, contact dermatitis, urticaria, seborrheic dermatitis, and IgE hyperplasia syndrome, as well as individuals lacking informed consent.

Measuring Tools:

The severity of the disease was evaluated by a physician using the AD Index (SCORAD) for scoring. The SCORAD index comprised six elements: erythema, edema/papulation, scaling, lichenification, discharge, and dryness. Ratings ranged from 0 to 103, with higher scores indicating a more severe skin condition. Scores below 15 were categorized as mild, scores between 15 and 40 as moderate, and scores above 40 as severe.

The Dermatitis Family Impact Questionnaire (DFI) consisted of 10 questions designed to assess the impact of AD on various aspects of family life. These domains included emotional disorders, sleep disturbances, the effect on home cleanliness, food, leisure activities, the relationship between the patient's parents, and the financial burden of treatment. The questions pertained to the preceding week. Each question was scored on a scale of 0 to 3, with values ranging from never (0), low (1), high (2), to very high (3). The final calculated score ranges from 0 to 30, with the lower scores indicating a better QoL (a score of 0 indicates no effect on parents' lives, while a score of 30 indicates a very large impact on the QoL of parents).

To evaluate the QoL of children aged 5-16 years with dermatitis, the Children Dermatitis Quality of Life Index (CDQOL) questionnaire was utilized. This questionnaire comprised 10 inquiries focused on evaluating the child's physical functioning and social interactions. Following the necessary computations, the resultant total score fell within the range of 0-30. Notably, higher scores were indicative of a diminished QoL.

Similarly, for infants aged 0-4 years with dermatitis, the Infants Dermatitis Quality of Life Index (IDQOL) questionnaire was employed to gauge their QoL. This questionnaire encompassed 10 questions assessing the infant's physical well-being and social relationships, which were completed by the parents or caregivers. Upon conducting the appropriate calculations, the overall score was determined, ranging from 0 to 30. Analogously, higher scores were associated with a decreased QoL for infants.

Additionally, the WHO Quality of Life-BREF (WHOQOL-BREF) questionnaire was utilized to examine the QoL across four domains: physical health, mental health, social relations, and environmental health. This questionnaire comprised 24 questions targeting these specific areas. Each domain garnered a score between 4 and 20, with a score of 4 representing the poorest condition, and a score of 20 reflecting the optimal state within the respective domain. These scores could be transformed to a scale of 0-100 for comparison purposes.

The Family Dermatology Life Quality Index (FDLQI) questionnaire was used to assess the effect of AD on parents' QoL. This questionnaire includes 10 questions about the impact of children's illness in different areas on the lives of their family members such as emotional distress, physical health, personal social relationships, reactions of others, leisure time, child care time, outdoor work, and job. Questions are about the impact of illness on parents' QoL in the past month. Each question contains a score of 3-0. After performing the necessary calculations, the maximum score is 30 and the minimum score is 0. Higher scores indicate lower QoL.

Statistical analysis

Continuous variables were expressed by mean ± SD and categorical variables by frequency and percentage. The association between gender of patients and the studied scores was performed using an independent sample t-test. The correlation between quality of life indexes (IDQOL/CDLQI/FDLQI / WHOQOL-BREF), Dermatitis Family Impact (DFI) with severity of AD (SCORAD evaluation index) and the age of the studied population was assessed using Pearson correlation coefficients. $P < 0.05$ was considered as statistically significant. All statistical analyzes were performed with Statistical Package for the Social Sciences (SPSS), version 21.0 for Windows.

Results

A total of 100 children were included in this study, 52 (52.0%) were males and 48 (48.0%) were females. The mean (SD) age of the patients was 5.96 (4.72) years. Fifty-seven patients (57.0%) were in the age group of 1 to 4 years, and 43 patients (43%) were in the age group of 5 to 16 years. Clinical assessment of the severity of AD, according to SCORAD index, demonstrated that 5 patients (5%) had mild AD, 90 patients (90%) had moderate AD, and 5 patients (5%) had severe AD. The mean (SD) score of the CDQOL questionnaire was 17.51 (4.56), the IDQOL questionnaire was 15.81 (4.88), the FDLQI questionnaire was 13.90 (5.94), and the DFI questionnaire was 6.39 (4.04), among patients with AD. The mean (SD) score of the WHOQOL-BREF (WHO Quality of Life-BREF) questionnaire which was used in four areas of physical health, mental health, social relations, and environmental health, were 20.79 (3.70), 17.75 (2.59), 9.72 (3.07), and 25.09 (4.93), respectively (Table 1).

Table 1. Population characteristics

Variables	Statistics
Mean of age (SD) years	5.96 (4.72)
Gender (%)	
Male	52 (52)
Female	48 (48)
SCORAD (%)	
Mild	5 (5)
Moderate	90 (90)
Severe	5 (5)
Mean (SD) of total SCORAD	28.10 (11.39)
Mean (SD) of CDQOL	17.51 (4.56)
Mean (SD) of IDQOL	15.81 (4.88)
Mean (SD) of FDLQI	13.90 (5.94)
Mean (SD) of DFI	6.39 (4.04)
Total mean (SD) of WHOQOL-BREF areas	73.35 (9.15)
Physical health	20.79 (3.70)
Mental health	17.75 (2.59)
Social relations health	9.72 (3.07)
Environmental health	25.09 (4.93)

As Table 2 shows, a positive correlation was observed between SCORAD evaluation index and IDQOL (Infants Dermatitis Quality of Life index), which was statistically significant ($r = 0.62$, p value < 0.001). Moreover, there was positive correlation between CDQOL and severity of AD (SCORAD index) in children aged 5-16 years, and this correlation was statistically significant ($r = 0.64$, p value < 0.001). Negative correlation was observed between FDLQI ($r = - 0.007$, p value $= 0.64$) and DFI ($r = - 0.13$, p value $= 0.19$), which was not statistically significant. Furthermore, there was negative correlation between domains of WHOQOL-BREF with severity of AD (SCORAD evaluation index), which were not statistically significant ($r_{\text{Social relations}} = - 0.06$, p value $=$ 0. 52; $r_{\text{Environmental health}} = - 0.08$, p value $= 0.37$, $r_{\text{Physical health}} = -0.06$, p value $= 0.52$, $r_{\text{Mental health}} = -0.18$, p value $= 0.06$).

The second row of Table 2 shows the correlation between QoL indexes (IDQOL / CDQOL / FDLQI / WHOQOL-BREF) and DFI with age of studied population. Positive correlation was observed between DFI score ($r = 0.12$, p value $= 0.22$) and the age of studied population, which were not statistically significant. Negative correlation was observed between IDQOL, CDLQI, and FDLQI scores with age of patients, none of them were statistically significant ($r_{\text{IDQOL}} = -0.10$, p value $= 0.44$, $r_{\text{CDLQI}} = -0.19$, *p* value = 0.9, r $_{\text{FDLQI}}$ = -0.2, *p* value = 0.84). Negative correlation was observed between physical health domain (r = -0.3, *p* value = 0.003), and mental health domain (r = -0.18, *p* value = 0.07) of WHOQOL-BREF score with age of patients, which were not statistically significant. Positive correlation was observed between social and environmental health domains' of WHOQOL-BREF score with age of patients, and these correlations were statistically significant (r $_{\text{Social relations}}$ = 0.2, *p* value = 0. 06, r $_{\text{Environmental health}}$ = 0.17, *p* value = 0.07) (Table 2).

Table 2. Correlation between quality of life indexes (IDQOL/CDLQI/FDLQI / WHOQOL-BREF) and Dermatitis Family Impact (DFI) with severity of AD (SCORAD evaluation index) and age of studied population.

Quality of life index **ρ Pearson**	**IDQOL**	**CDQOL**	**FDLQI**	**SCORAD**	**DFI**	**WHOQOL-BREF**			
						Social relations	**Environmental health**	**Physical health**	**Mental health**
SCORAD	0.62	0.64	-0.007		-0.13	-0.06	-0.08	-0.06	-0.18
p value	< 0.001	< 0.001	0.64		0.19	0.52	0.37	0.52	0.06
Age	-0.10	-0.19	-0.2	0.76	0.12	0.2	0.17	-0.3	-0.18
p value	0.44	0.9	0.84	0.45	0.22	0.06	0.07	0.003	0.07

Table 3. Comparison of questionnaires scores among patients according to gender

Variables	**Mean (SD)**		***p* value***
	Boys	**Girls**	
IDQOL	16.52 ± 5.35	14.83 ± 4.6	0.20
CDQOL	19.37 ± 5.95	16.04 ± 2.27	**0.01**
FDQLI	12.69 ± 4.68	15.21 ± 6.88	**0.03**
DFI	5.15 ± 3.33	7.73 ± 4.49	**0.001**
BREF-physical domain	21.73 ± 3.6	19.77 ± 4.09	**0.008**
BREF-mental domain	17.96 ± 2.41	17.56 ± 2.75	0.44
BREF-social domain	9.56 ± 1.46	9.9 ± 4.17	0.59
BREF-environmental domain	25.33 ± 4.37	24.83 ± 5.50	0.61
WHOQOL	74.17 ± 8.50	72.46 ± 9.82	0.35

Independent sample t-test

As Table 3 displays, the mean IDQOL was higher among boys than girls (16.52 ± 5.35 vs. 14.83 ± 4.6, respectively), but the difference was not statistically significant (*p* = 0.20). The mean CDQOL was higher among boys than girls (19.37 ± 5.95 vs. 16.04 ± 2.27, respectively), and there was a significant difference between them (*p* = 0.01). The mean FDQLI and DFI were higher among girls than boys (15.21 ± 6.88 vs. 12.69 ± 4.68 and 7.73 ± 4.49 vs. 5.15 ± 3.33, respectively), and there was a significant difference between them (*p* = 0.03 and *p* = 0.001, respectively). The mean BREF-physical and environmental domain were higher among boys than girls (21.73 ± 3.6 vs. 19.77 ± 4.09 and 25.33 ± 4.37 vs. 24.83 ± 5.50, respectively) and there was a significant difference between them (*p* = 0.008 and *p* = 0.61, respectively). The mean BREF-mental and social domain were the same among boys and girls (17.96 ± 2.41 vs.17.56 ± 2.75 and 9.56 ± 1.46 vs.9.9 ± 4.17, respectively), but no significant difference was observed between them (*p* = 0.44 and *p* = 0.59, respectively). The mean WHOQOL was almost higher among boys than girls (74.17 ± 8.50 vs. 72.46 ± 9.82, respectively), but no significant difference was observed between them (*p* = 0.35).

Discussion

AD can have a significant impact on the daily activities and overall development of children in the pediatric population, potentially leading to adverse behavioral effects. The relationship between disease severity and QoL in children, especially in community-based studies, remains poorly understood. The results of this study revealed that 52% of patients with AD were male, which contradicts the prevalence reported by the International Study of Asthma and Allergies in Childhood (ISAAC), where females exhibited a higher disease prevalence. Similarly, previous studies conducted by Singh et al. and Shariati et al. (16, 17) also observed a greater proportion of boys among the participants. Epidemiological investigations have shown a slight predominance of males with AD in North America, certain Latin American countries, and select European nations, such as Germany (18). These discrepancies across studies could be attributed to regional, cultural, and genetic differences (19).

The research findings showed that, according to the SCORAD index classification system, mild atopic dermatitis (AD) was detected in five individuals (5%), moderate AD in 90 individuals (90%), and severe AD in five individuals (5%) (1). It is worth noting that mild and moderate forms of AD are more prevalent among children, but severe forms can significantly impact their social integration (20). Consequently, the management of patients with severe AD necessitates collaborative efforts from pediatric allergologists, dermatologists, psychiatrists, and psychologists (21, 22). The relationship between disease severity and QoL is unlikely to remain consistent across different disease stages, as it may become stronger or weaker (23). In another study, 36.54% of patients were observed to have moderate disease severity, while 63.46% had severe disease severity. This current study supports the previous finding that increasing disease severity in both age groups of children leads to a decrease in their QoL. The consistency of this finding aligns with previous research indicating a robust and inverse association between disease severity and QoL among AD patients (24).

The study findings indicated that the average FDLQI questionnaire score reported by parents of patients was 13.90 (5.94), suggesting a moderate impact of children's AD on parental QoL. The study did not find a significant influence of disease severity on parental QoL, as measured by the FDLQI questionnaire. However, a prior study conducted by Marciniak et al. (25) reported higher QoL scores for parents of AD patients, with mean scores of 17.13 (5.3) for mothers and 14.7 (5.8) for fathers. The study observed a similar impact of children's AD on social life, leisure time, and daily expenses for both parents (25). Likewise, in a study conducted in Greece by Tadros et al. (26) on patients with psoriasis and their families, a reduction in family QoL, as assessed by the FDLQI questionnaire, was noted. This reduction in family QoL showed a positive correlation with the reduction in patients' QoL, as measured by the DLQI. The present study conducted correlational analysis between FDLQI and disease severity, evaluated by

SCORAD, and found that increased disease severity was associated with greater impairment in parental QoL. Previous studies using only the DFI also revealed a positive correlation between the severity of children's AD, as measured by SCORAD, and parental QoL (27, 28).

In this particular study, the researchers utilized both the DFI and FDLQI questionnaires to assess the QoL of parents who had children diagnosed with AD. In contrast to previous studies (29, 30), the findings from this study did not indicate a significant correlation between the severity of the disease and the QoL of parents. This could possibly be attributed to the fact that 90% of the patients involved in this study had moderate disease severity, while only 10% had mild or severe disease severity.

The study results revealed that there was no noteworthy association between disease severity and the parents' quality of social interactions, physical well-being, and environmental circumstances. However, a significant correlation was found between disease severity and the parents' mental well-being. A study conducted by Chernyshov et al. (31) in multiple countries in 2013 yielded similar results, identifying emotional stress and psychological challenges arising from their child's illness as major concerns for parents of children with AD, particularly when the severity of eczema increased. Moreover, the extent of the child's skin involvement was linked to a heightened severity of these psychological pressures.

Our findings displayed that the mean IDQOL score was found to be higher among boys than girls. However, no significant gender difference was observed in the overall IDQOL score, which is consistent with the findings of previous studies (32, 33). In contrast, Chernyshov (34) reported that the impact of AD on QoL was more severe for girls. On the other hand, our study found a significant difference between CDLQI scores and gender, which is contrary to the findings of Baici et al. (35), who reported no statistically significant gender differences in the CDLQI subscale scores.

The primary limitation of this study was the small sample size of participants. Obtaining results from a larger and older sample size would likely yield more accurate results. To ensure that patients fully understood that participation in the study was not a form of intervention or treatment, they were provided with adequate explanations, as some patients might have been hesitant to participate. Additionally, low parental participation in the study was another limitation. In future research, it may be beneficial to consider cultural and traditional family models to better understand the impact of AD on the QoL of children and their families.

Conclusion

To summarize, this study observed that a majority of patients diagnosed with AD exhibited moderate disease severity. The QoL of parents with children affected by AD was significantly affected, specifically in terms of social relationships and psychological well-being. The findings strongly suggest that disease severity has a notable impact on the lives of children across all age groups. These results highlight the importance of developing comprehensive therapeutic guidelines that consider both clinical symptoms and QoL aspects.

Acknowledgments

The authors would like to express their gratitude to the Clinical Research Development Unit of Imam Khomeini Hospital, Urmia University of Medical Sciences, for English editing.

Conflict of interest

The authors have no conflict of interest in this study.

Funding/support

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability

The raw data supporting the conclusions of this article are available from the authors upon reasonable request.

Ethical statement

The study was approved by the Ethics Committee of Urmia University of Medical Sciences with code: IR.UMSU.REC.1400.173.

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