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Impact of atopic dermatitis on the quality of life of Nigerian children: A hospital-based cross-sectional study

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Background. Atopic dermatitis (AD) is the most common inflammatory skin disease in childhood. A skin disorder with a relapsing course, AD exerts a significant disease burden on affected children. However, there is a dearth of knowledge about the impact of AD on the quality of life (QOL) of affected children in Nigeria.
Objectives. To examine the impact of AD on QOL in children of various age groups, and to identify the relationship between patient variables (age, gender, socioeconomic status), disease severity and QOL in AD.
Method. This was a cross-sectional descriptive study of children with AD attending the dermatology clinic of Lagos University Teaching Hospital, Idi-Araba, Lagos, Nigeria. AD cases were recruited from new paediatric patients ≤16 years who attended the clinic over a 6-month period. English and Yoruba versions of the Infants' Dermatitis Quality of Life Index (IDQOL) and the Children's Dermatology Life Quality Index (CDLQI) were used to determine the QOL of the subjects. AD severity was evaluated using the Objective SCORing of Atopic Dermatitis (obj-SCORAD) index.
Results. Forty-seven subjects with AD were identified. Their ages ranged from newborn to 16 years. The median(interquartile range (IQR)) IDQOL score was 6.0 (3.0 - 15.5; *n*=25), and the median (IQR) CDLQI score was 9.5 (7.75 - 17.75; *n*=22). The mean (standard deviation) obj-SCORAD score was 34.4 (17.2). The question on itching was the highest-scoring question in both QOL questionnaires. There was no significant difference in QOL across age, gender and socioeconomic status groups. However, greater QOL scores were significantly correlated with higher AD severity scores.
Conclusion. The study confirms that AD impairs the QOL of affected children in all age groups. QOL assessments are relevant tools which provide a patient's perspective, thus improving the understanding of the impact of AD on afflicted individuals.

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Atopic dermatitis (AD) is the most common inflammatory skin condition observed in children.[1] This disease follows a chronic relapsing course, and may be associated with respiratory allergies such as asthma or allergic rhinitis (the atopic triad).[2] The prevalence of AD shows worldwide variation between 2% and 20%.[1] In Nigeria, prevalence rates range from 4.2% to 15.5%, with lower prevalence rates reported among children in rural areas and of lower socioeconomic class.[3-5] AD occurs most commonly among infants, and prevalence decreases with increasing age.[1] Recent studies have reported an increase in the prevalence of AD worldwide, which has been attributed to changes in lifestyle, nutrition and other environmental factors.[6]

AD is characterised by pruritus, dry skin and a rash which may become lichenified with flexural involvement as the disease progresses.[7] The chronic nature of AD, characterised by flares, can have significant impact on patients and their families.[8] In children, the most troublesome symptom is itching.[9] The effect of night-time itching and scratching on sleep is often considerable. The sleep patterns in school-aged children with AD studied with home polysomnography were found to have frequent awakenings associated with scratching episodes, and reduced sleep efficiency compared with healthy controls.[10] Children may lose up to 2 hours of sleep per night.[11] Poor school performance characterised by daytime drowsiness and inability to focus has also been documented in affected children due to pruritus and daytime use of sedating oral antihistamines to alleviate the physical discomfort.[12] Parents of young children with AD describe their children as being clingy, fearful and frustrated, as the presence of itchy, painful and weepy lesions may result in discomfort or pain on touch, which may impair parent-child bonding.[13]

Schoolchildren with AD tend to be more aware of their appearance compared with younger children, and may choose to abstain from play activities or to wear certain clothes in order to avoid embarrassment.[14] This may affect relationships with peers and teachers.[15] The demands of care can also negatively impact families, affecting spousal relationships and interfering with parents' care of other siblings.[15] Lawson *et al.*[14] evaluated the burden of care among parents of children with AD, and observed that 71% of parents felt psychological pressures, including guilt, exhaustion, frustration, resentment and helplessness, while 64% of parents admitted to having their sleep disturbed by the night-time itching and scratching of their child.

Health-related quality of life (HRQL) denotes the state of an individual's quality of life (QOL) as it pertains to health and disease and/or treatment.[16] HRQL measurements are needed for comparison between alternate treatments, provision of information for evaluation of survival data, allocation of resources in healthcare, auditing of health services and as aids in management decisions.[17] QOL can also be used to assess the burden of illness and the outcomes of related medical treatments.[8]

The Dermatology Life Quality Index (DLQI) is the most frequently used dermatology-specific QOL instrument in randomised clinical trials in dermatology.[18] It has been modified for use in children aged <5 years as the Infant's Dermatitis Quality of Life Index (IDQOL).[9] Similarly, the Children's Dermatology Life Quality Index (CDLQI) has been adapted for use in schoolchildren aged 5 - 16 years.[18] Akinboro *et al.*[19] validated the CDLQI in a study of children with tinea capitis in a rural community in Oshogbo, Nigeria, making it suitable for use in Nigeria.

The impact of AD on the QOL of affected children is well recognised in developed countries.[20,21] However, these findings cannot simply be extrapolated to children in developing countries. Hence the aim of this study was to examine the impact of AD on QOL in Nigerian children, to identify relationships between patient variables, disease severity and QOL in AD. Information obtained from the patient point of view will improve the current understanding of the disease burden. This will promote better patient compliance and provide additional data for proper healthcare planning.

Materials and methods

This cross-sectional study was conducted between November 2012 and May 2013 in the dermatology clinic of the Lagos University Teaching Hospital, Idi-araba, Lagos State, Nigeria. The sample in this study was drawn from 228 children aged ≤16 years who attended the clinic during the study period for the first time. The study population was calculated using the sample size formula for a finite population[22] with a prevalence rate of 7%, based on an ISAAC Study in Nigeria.[23] Participants and their parents/guardians were provided with detailed information about the study and assured that confidentiality would be ensured. The inclusion criteria were a diagnosis of AD, according to the UK Working Party's (UKWP)[24] diagnostic criteria, the age range of the children (from newborn to 16 years) and oral and/or written informed consent. The exclusion criteria were inability to obtain parental consent/assent for adolescents, previous clinic attendance and the presence of any chronic non-dermatologic medical condition that may have had an additional impact on QOL. The participating children were divided into three age groups: <5 years, 5 - 10 years and 11 - 16 years.

Case definition

For the purpose of this study, the UK Working Party (UKWP)[24] criteria for the diagnosis of AD were used to identify cases. These criteria have been validated in Nigeria by Odusote.[25] A diagnosis of AD is made in the presence of a pruritic rash and three or more of the following features:

(*i*) a history of rash in the skin creases (fold of the elbow, behind the knees, front of the ankles and around the neck);
(*ii*) a personal or family history of asthma and hay fever;
(*iii*) history of generalised dry skin (xerosis);
(*iv*) onset before the age of 2 years; and
(*v*) visible flexural dermatitis.

Data collection

Demographic data of all individuals recruited for the study, including biodata and composite variables (father's and mother's occupations and levels of education) to assess the socioeconomic status of the patient, were recorded.

QOL assessment

QOL was assessed among all recruited subjects using the English or Yoruba versions of either the IDQOL for children aged <5 years, or the CDLQI for children aged 5 - 16 years. The QOL questionnaires were self-administered. The primary investigator explained to the caregiver or child how to complete the questionnaires prior to answering them. For children <5 years old, the IDQOL questionnaire was completed by caregivers. Children aged 5 - 16 years answered the CDLQI questionnaires; the parents/guardians helped the younger children to understand the questionnaires, while the older children answered the questions themselves.

IDQOL index:[9] The IDQOL was used for children <5 years and was completed by the parent or caregiver. The IDQOL consists of 10 questions that address symptoms and difficulties with mood, sleep (two questions), play, family activities, mealtimes, treatments, dressing and bathing over the last week. Each question has 4 options as answers, which are scored 0 - 3 according to the severity of the symptoms, with 3 as the most severe.

CDLQI:[18] The CDLQI was used to measure QOL in children aged 5 - 16 years. It comprises a 10-question questionnaire on symptoms of AD, in subscales relating to symptoms and feelings (questions 1 and 2), leisure (questions 4, 5 and 6), school or holidays (question 7), personal relationships (questions 3 and 8), sleep (question 9) and treatment (question 10), within the last week. Each question of the CDLQI is answered by 'not at all,' 'only a little,' 'quite a lot,' or 'very much', and scored 0, 1, 2 or 3, respectively. The one exception to this scoring system is found in question 7, where the possible answer 'very much' is replaced by 'prevented school', and the question is also scored 0 - 3.

For both the IDQOL and CDLQI, each subject's total score was calculated by adding the scores of the 10 questions. The highest possible score is 30, and the lowest 0; the higher the score, the more the QOL of the subject is considered impaired. Total QOL scores of 0 - 10, 11 - 20 and >20 represent mild, moderate and severe impairment, respectively.[26]

Assessment of disease severity

The objective SCORing of Atopic Dermatitis (obj-SCORAD) index[27] was used to assess AD disease severity, where the higher the score, the more severe the skin condition. It consists of a combination of two items: topography, or extent of skin involvement (section A), and intensity of dermatitis (section B).

Individuals with AD were taken to a well-lit, quiet, private and warm room. After ensuring that parental consent/subject assent were still valid, these subjects were asked to undress to allow for close observation of the skin, and then examined by the primary investigator.

To assess disease extent/surface area (A), affected areas of skin were plotted on the Wallace rule of nines body chart[28] section of the obj-SCORAD to estimate the total percentage area affected. Disease extent is graded from 0 - 100.[27] For disease intensity (B), the primary investigator assessed six clinical signs – erythema, oedema/induration, excoriation, lichenification, oozing/crusting and dryness (xerosis) – at a single representative site (the most affected). Each sign was graded from 0 to 3 (0 = absent; 3 = severe). Disease intensity was graded as 0 - 18.[27] Obj-SCORAD is a weighted index, with greater emphasis placed on intensity (multiplying by a factor of 3.5), and less weight on the extent (multiplying by a factor of 0.2).[27] The highest possible score is 83.

The obj-SCORAD score was calculated using the formula (A/5 + 7B/2).[27] Total obj-SCORAD scores were classified as mild (<15), moderate (15 - 40) or severe (>40), following the recommendation by Kunz *et al.*[27] Disease severity was estimated by the same dermatologist using the obj-SCORAD index.

Translation protocol

Written permission was obtained from the owners of the IDQOL questionnaire for its translation and use in the study. Two forward translations into the Yoruba language were carried out by two independent bilingual native Yoruba translators, after which an agreement on a translation was reached. This consensus version was translated back

into English by a third and a fourth independent bilingual translator. These two distinct translations were reviewed by the copyright holders. In addition, the graphical layout of the questionnaire was kept as close to the original English version as possible.

Socioeconomic status

Parents' socioeconomic status was classified into upper (I and II); middle (III) and lower (IV and V) groups using the method described by Oyedeji.[29] This method of classification uses the parents' level of education and occupation to categorise the parents into socioeconomic groups I - V.

Ethical clearance

The study protocol was approved by the Health Research Ethics Committee of the Lagos University Teaching Hospital (LUTH) Lagos, Nigeria (ref. no. ADM/DCST/HREC/APP/1252). Privacy and confidentiality were ensured by avoiding the use of sensitive information and real names in the questionnaire for data collection.

Statistical analysis

Data were collected and stored on an electronic database. Statistical analysis was performed using SPSS (IBM Corp., USA) package for Windows (Microsoft, USA) version 20.0. Disease severity groups (mild, moderate, severe) were classified in function according to the obj-SCORAD ranges.[27] Normally distributed quantitative variables were analysed using *t*-tests and analyses of variance (ANOVA). For skewed distribution, Mann-Whitney U-tests, Kruskal-Wallis tests and Spearman's rank correlations were used.

Specifically, total QOL (CDLQI and IDQOL) scores and items (questions) were compared between the sociodemographic groups. Correlation tests were carried out to determine associations between sociodemographic variables (age, gender and socioeconomic status) disease severity and total QOL scores. Further analysis was carried out to determine what variables were associated with severe QOL impairment, which was taken as a QOL score >20. QOL scores of individuals with AD (according to age, gender and AD severity groups) were compared ($p<0.05$ was considered statistically significant).

Results

A total of 228 children were seen during the study period; of these, 47 AD cases were identified using the UKWP diagnostic criteria, and included in the study. Of these, 25 were <5 years old, while 22 were aged between 5 and 16 years. Demographic information for the cohort is listed in Table 1.

IDQOL index

The median (IQR) IDQOL score was 6.0 (3.0 - 15.5; $n=25$). Questions on itching/scratching, mood, time taken to get to sleep, treatment and dressing were the highest-scoring items (Table 2).

CDLQI

The median (IQR) CDLQI score was 9.5 (7.75 - 17.75; $n=22$). The highest-scoring CDLQI items were questions on itching/scratching, embarrassment and play (Table 2).

Table 3 shows the QOL (IDQOL/CDLQI) scores of children with AD by sex. The median QOL score was higher among females than males. However, this difference was not statistically significant (Mann-Whitney U=2.070; $p=0.150$).

Among children with AD, median QOL (IDQOL/CDLQI) scores increased with age, but this was not statistically significant (Kruskal-Wallis $\chi^2=5.327$; $p=0.70$) (Table 4).

Table 5 shows that there was no significant difference in QOL (IDQOL/CDLQI) scores across the socioeconomic classes (Kruskal-Wallis $\chi^2=0.133$; $p=0.936$).

Table 1. Sociodemographic characteristics of study population (*N*=47)

Characteristic	*n* (%)*
Age (years)	
<5	25 (53.2)
5 - 10	18 (38.3)
11 - 16	4 (8.5)
Age, mean (SD)	4.71 (3.6)
Sex	
Male	24 (51.1)
Female	23 (48.9)
Parents' socioeconomic status	
Upper	26 (55.3)
Middle	11 (23.4)
Lower	10 (21.3)
QOL score (IDQOL/CDLQI)	
Mean (SD)	10.5 (7.5)
Median (IQR)	8.0 (5.0 - 16.0)

IDQOL = Infants' Dermatitis Quality of Life Index; CDLQI = Children's Dermatology Life Quality Index; SD = standard deviation; IQR = interquartile range.
*Unless otherwise indicated.

Using Spearman's correlation, there was no significant correlation observed between QOL scores and age, gender and socioeconomic status. However, a significant correlation was observed between QOL scores and disease severity (obj-SCORAD) ($r_s=0.328$; $p=0.024$). There was no significant correlation between disease severity (obj-SCORAD scores) and age, gender and socioeconomic status (Table 6).

Discussion

The study identified 47 children with AD who met the UKWP diagnostic criteria. Just over half (53.2%) of the children identified were <5 years old, while the frequency was lowest among 11-16 years of age. This finding is in agreement with prevalence trends shown in other studies in Nigeria.[3-5] Previous epidemiological findings have also shown that AD typically occurs most commonly among infants, and the prevalence decreases with increasing age.[1]

The index study revealed that AD significantly impacts on the QOL of affected children. The mean (SD) QOL (IDQOL/CDLQI) score for children with AD in this study was 10.5 (7.5), which was higher than the scores of 9.2 (7.8) and 7.7 (5.6) observed by Lewis-Jones and Findlay[18] and Beattie and Lewis-Jones,[20] respectively, among children with AD in paediatric dermatology clinics in the UK. However, the observed mean score was comparable to the 9.8 (4.5) observed among children with AD in Egypt.[30] The high mean QOL score observed in the index study may be attributed to the high proportion of individuals with moderate to severe disease, which was also the case in the Egyptian study; over 80% of subjects had moderate to severe disease in both studies. Lower mean QOL scores have been documented among children with AD recruited from general practice clinics, owing to a lower proportion of severe cases.[9,31]

The question on 'itching' was the highest-scoring question in both the IDQOL and CDLQI questionnaires. This corroborates reports on children with AD in numerous countries worldwide.[7,9,31,32] Pruritus is the hallmark of AD, reported in up to 91%[11] of affected individuals. Previous reports have established a significant association between QOL impairment and pruritus in AD,[10,11] and may explain this trend.

Among children >5 years, the itching was severe enough to affect questions on 'mood', and 'time taken to get child to sleep'. Previous studies have reported that night-time itching in children with AD affects both the quality and quantity of patients' sleep.[33] This may cause tiredness, irritability and problems with concentration and

Table 2. IDQOL and CDLQI scores of children with AD

IDQOL items	Median (IQR) *n*=25	CDLQI items	Median (IQR) *n*=22
Itching/scratching	2.00 (1.00 - 3.00)	Itching/scratching	3.00 (2.75 - 3.00)
Mood	1.00 (0.00 - 2.50)	Embarrassment	2.00 (1.00 - 3.00)
Time to get to sleep	1.00 (0.00 - 2.00)	Friendships	1.00 (0.00 - 2.25)
Sleep disturbance	0.00 (0.00 - 2.00)	Clothing	0.00 (0.00 - 1.00)
Playing	0.00 (0.00 - 1.00)	Playing	2.00 (0.00 - 3.00)
Family activities	0.00 (0.00 - 1.00)	Sporting activities	0.00 (0.00 - 1.25)
Mealtimes	0.00 (0.00 - 1.00)	School	1.00 (0.00 - 2.00)
Treatment	1.00 (0.00 - 2.00)	Teasing/bullying	0.50 (0.00 - 2.00)
Dressing	1.00 (0.00 - 2.00)	Sleep	1.00 (0.00 - 2.25)
Bath time	0.00 (0.00 - 1.50)	Treatment	1.00 (0.00 - 2.00)
Total IDQOL score	6.00 (3.00 - 15.50)	Total CDLQI score	9.50 (7.75 - 17.75)

IDQOL = Infants' Dermatitis Quality of Life Index; CDLQI = Children's Dermatology Life Quality Index; AD = atopic dermatitis; IQR = interquartile range.

Table 3. QOL scores among children with AD by sex (*N*=47)

Sex	Frequency, *n*	Median (IQR) QOL score
Female	24	9.50 (6.00 - 16.25)
Male	23	7.00 (3.50 - 14.00)

QOL = quality of life; IQR = interquartile range.
Mann-Whitney U=2.070; *p*=0.150.

Table 4. QOL scores among children with AD by age group (*N*=47)

Age (years)	Frequency, *n*	Median (IQR)
<5	10	6.00 (3.00 - 15.00)
5 - 10	11	9.40 (7.25 - 16.75)
11 - 16	26	12.00 (8.00 - 17.75)

QOL = quality of life; IQR = interquartile range.
Kruskal-Wallis χ^2=5.327; *p*=0.70.

Table 5. QOL scores among children with AD by socioeconomic class (*N*=47)

Socioeconomic status	Frequency, *n*	Median (IQR) QOL score
Lower	10	8.50 (7.25 - 14.50)
Middle	11	8.00 (5.50 - 13.00)
Upper	26	9.50 (4.00 - 16.00)

QOL = quality of life; IQR = interquartile range.
Kruskal-Wallis χ^2=0.133; *p*=0.936.

Table 6. Spearman's correlation matrix between sociodemographic variables (age, gender and socioeconomic status), disease severity (obj-SCORAD) and QOL scores

Variable	r_s	*p*-value
Age	–0.043	0.774
Gender	0.113	0.450
Socioeconomic status	0.279	0.058
QOL	0.328	0.024

Obj-SCORAD = Objective SCORing of Atopic Dermatitis score; QOL = quality of life.
r_s = Spearman's correlation co-efficient.

learning, resulting in poor performance at school.[7,31] The questions on 'treatment' and 'problems with dressing' also scored highly in this study. This may be due to the frustration of parents with obtaining effective treatment and appropriate clothing for their children. AD is a chronic condition and runs a relapsing course. Morrone[34] notes that in developing countries, over 90% of cutaneous conditions are treated by primary care providers with little or no dermatology training, resulting in high failure rates. In addition, the trend towards self-medication with potent topical steroid creams and topical herbal applications may further worsen the disease, and consequently patients' QOL.[35] In our study, both of these situations were confirmed, as over 80% of subjects had been to a general practitioner or used steroid creams prior to recruitment.

In the group of older children evaluated using the CDLQI, 'feelings of embarrassment' and 'playing' were also affected. In South Korea, Kim *et al.*[32] reported itching, sleep and feelings of embarrassment as the most highly rated problems among children with AD aged 5 - 16 years. A similar observation was made by Ben-Gashir *et al.*[31] among children in the UK. In this study, children affected by AD felt embarrassed/self-conscious about their skin problem, and this was severe enough to interfere with playtime and schooling. This corroborates reports in numerous studies among children with AD in developed countries.[8,31] Stigmatisation of children with skin disease, especially AD, is common, as reflexes that associate any skin disease with contagion are still prevalent.[36] This may cause avoidance in peers, and in some instances, children may be excluded in the long term from school for fear that they will infect other children with a contagious disease.

The impact of age, gender, socioeconomic status and disease severity as determinants of QOL was also evaluated in the present study. Disease severity (the obj-SCORAD score) was the only factor associated with QOL impairment in the children. A significant positive correlation was observed between obj-SCORAD scores and QOL scores (that is, the greater the disease severity, the greater the QOL impairment). This compares with the results of studies among children with AD in Italy,[37] Egypt[30] and the UK.[31] Hassab-el-Naby *et al.*[30] in Egypt evaluated 100 school-aged children with AD recruited from a dermatology clinic, and observed significantly greater QOL impairment with increasing disease severity. By contrast, Van Valburg *et al.*,[9] in a study of preschool children with AD recruited from a general practice clinic, reported no significant association between QOL scores and obj-SCORAD scores, which was probably a result of using a proxy estimation of QOL and there being a larger proportion of individuals with mild disease.

Few studies have utilised the obj-SCORAD index to evaluate the severity of AD among children in sub-Saharan Africa. The mean (SD) obj-SCORAD score in this study was 34.4 (17.2), which was comparable to the 27.9 (8.3) observed in Egypt.[30] This is not surprising, as both studies were carried out in dermatology clinics. However, lower mean obj-SCORAD scores were reported in general practice clinics in the UK[38] and the Netherlands.[9] The higher proportion of individuals with moderate to severe disease in studies in dermatology clinics may be attributed to delays in presentation to the dermatologist, as there are few dermatologists in developing countries, with most within the tertiary hospitals. Therefore, in order to reduce the burden of care at the tertiary centres, there is a need for continued education of primary care providers on current treatment guidelines, to ensure effective management of AD, thus reducing its impact on QOL.

Limitations

The study was carried out in a specialist dermatology clinic, which may introduce a selection bias for individuals with severe disease. As such, the observed correlation between QOL and disease severity should be interpreted with caution when extrapolated to general practice clinics/the general population. The possibility of information bias during data collection on QOL, as a proxy (parent/caregiver) answered QOL questions for the children <5 years old, and also helped/guided the children between 5 - 10 years to answer the questions. The ability to thoroughly assess school activity would have helped to better understand the impact of AD on school performance. In addition, a larger study involving both the public and private sectors would add more value to the research results.

Conclusion

Our study has revealed that AD significantly impairs the QOL of affected children, especially those with severe disease. Among children with AD, greater disease severity is associated with greater impairment of QOL. It is therefore recommended that QOL measures are used in clinical practice, as this will offer additional data about QOL impairment in AD from the patient's point of view. This perspective is often missed by clinical evaluation alone. Such information from the patient's perspective will aid in healthcare decision-making, which will enhance comprehensive care and patient compliance.

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