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The Impacts of Tinea Capitis on Quality of Life: A Community Based Cross Sectional Study among Nigerian Children

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Abstract: Despite the untold prevalence of tinea capitis (TC) among children in the developing countries, no single study has examined its impacts on children's quality of life (QoL). The focus of the present study is to examine the impacts of TC on QoL and to identify the patients and disease variables that affect QoL as determined by the Children's Dermatology Life Quality Index (CDLQI). A multistage probability random sampling was conducted among predominantly Yoruban children. A total of 370 children, 185 children with TC and 185 without TC, were recruited as subjects and controls. The CDLQI test instrument was translated and validated in a pilot study before use. Diagnosis of TC was done through microscopy and CDLQI questionnaire was administered to both subjects and controls. A total of 131 (70.8%) boys and 54 (29.2%) girls with TC were included as subjects, with the mean age of 7.31 ± 2.52 years. There was no significant difference between the ages of the subjects and controls ($P = 0.67$). The children with TC had significantly higher mean CDLQI score than the control, 7.17 ± 3.034 versus 0.00 ± 0.000 respectively ($t = 32.132$, $P < 0.001$). The physician assessed severity was identified as a significant factor by the mean of total CDLQI, with an Eigenvalue of 3.57 (canonical correlation, $r = 0.88$; $\chi^2 = 276.265$; $df = 2$; $P < 0.001$). Symptom/feeling and treatment subscales were mostly impaired. Symptoms such as itching, alopecia, adenopathy, and difficulties due to treatment contributed most significantly to QoL impairment ($P < 0.01$). TC onset after age 5 years, teenage presence, level of education, atopy history and clinical type of TC were important factors which negatively affect QoL. In this we identified the patient and disease variables that negatively affect QoL among children with TC.

Keywords: tinea capitis, QoL, CDLQI, children

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Introduction

Tinea of the scalp is one of the superficial infections of worldwide distribution that disproportionately affects children residing in the humid regions of the world.^{1,2} In the tropics, tinea capitis (TC) is usually aesthetically unacceptable, as it “can be unsightly or disfiguring; impede mobility and performance”.³ It could also be a source of mental distress and anxiety for affected individuals.³ The continuing presence of TC in the 21st Century is disturbing and readily brings to mind issues of social stigma, dirt, slums, and the shaven scalps that characterized previous outbreaks in most European cities more than a century ago.^{3,4} Unfortunately, due to poor socio economic condition, this long recognized social menace is still present and spreading rapidly among children with variable prevalence in the schools, cities, and villages in sub-Saharan Africa. Exploring how this dermatological disease affects the children’s quality of life is important.

Quality of life (QoL) is defined as the individuals’ overall satisfaction with life and general sense of wellbeing.⁵ It is “an individual’s perception of his or her position in life in the context of the culture and value systems in which he or she lives, and in relation to his or her goals, expectations, standards and concerns.”⁶ Published reports on impacts of skin disease on QoL among children and adults are scarce in Nigeria. Despite its widespread prevalence and challenges of its control among the children, its impact on the psychological state of children has not been thoroughly examined.

This study aimed to use the Children’s Dermatology Life Quality Index (CDLQI) questionnaire (translated into Yoruba) to explore the QoL among those children infected with TC. The CDLQI is a dermatology specific instrument assessing QoL among children aged 5 to 16 years of age. The CDLQI is a simple and self-explanatory instrument that assesses of QoL in one or two minutes with minimal assistance of parent or guardian required for younger children.⁷ Permission was sought to translate the instrument to Yoruba language (one of the 3 major Nigerian languages) from the copy right holder. The translation and cognitive de-briefing protocol was followed as required by the copy right holder. A brief validation of the translated protocol was conducted among children with various dermatological conditions to correct all inherent translational errors. The Yoruba

version of CDLQI was used among Yoruba children with TC in a typical African setting.

Subjects, Materials, and Methods

This cross sectional study was conducted between August and December 2010 at Ilie, community of Olorunda, Local Government area of Osogbo, Osun state, Nigeria. A probability multistage sampling that randomly selected communities, compounds, and thereafter households was conducted. Children whose microscopies were positive for dermatophyte fungi were included in the analysis. A total of 370 children were included in the study; this included 185 children with TC, 5–16 years of age, whose scalp scrapping was positive microscopically for dermatophyte and without other major dermatological or chronic disease. The researchers also recruited 185 apparently normal children without TC or any overt skin disease or other chronic ailments as control. The researchers explained the purpose of the study to the parents and their children in the local Yoruba language, and informed consent was obtained from parents whose children were enrolled in the study. The study was approved by the Ethical committee of Ladoke Akintola University Teaching Hospital, Osogbo.

The procedure to produce a properly validated translation were followed. Written permission was obtained from the owners of CDLQI questionnaires for translation and its use in the study. Two translations into Yoruba language were carried out by two independent bilingual native Yoruba translators. These two translators then came together to discuss their translations and produced a single Yoruba version. This consensus version was back translated into English by a third and fourth independent bilingual translators. These two distinct English translations were reviewed by the copyright holders. The noted discrepancies from the original English version were corrected by further back translation, and the Yoruba version was ready for use. The layout of the final Yoruba version of CDLQI was made graphically similar to the original English version. The CDLQI comprises of ten questions which are classified to the following subscales: 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).⁷ As designed by Lewis-Jones et al,⁷



the original copyright holder, each question of the CDLQI was answered by “not at all,” “only a little,” “quite a lot,” or “very much” and was scored 0, 1, 2 or 3, respectively. The one exception to this scoring is found in question 7 where the answer “very much” is replaced with “prevented school” and was similarly scored 3.⁸ The total CDLQI score was calculated by adding the scores of the 10 questions. In the scoring system, the higher the score, the more the QoL of the subject is impaired. The highest possible score is 30, while the lowest possible score is 0.⁷ The children that scored lowest point have least affected QoL.⁷

A brief validation of the Yoruba version of the CDLQI was undertaken. A subsample of 19 children (10% of cases and 10% of controls) was studied using patients with various dermatological diseases. The CDLQI questionnaire was administered twice, with a 2 week interval between the two assessments. The 2 week interval was chosen to minimize the children’s ability to remember their previous answers given. Subsequently, the researchers reviewed the content validity and the language of the questionnaire was reviewed for any ambiguity. The CDLQI (Yoruba) has not been validated in Nigeria before now.

A structured questionnaire comprising of the subjects’ socio-demographic data and disease related clinical variables was also administered to the subjects. TC was classified as mild, moderate, or severe using the presence of extensive alopecia and/or pustules as factors.

Data Analysis

Data from the study were entered into and analyzed using Statistical Product and Service Solution 16.0 (SPSS Chicago Inc., IL, and USA). The mean \pm standard deviation (SD) of the total CDLQI was summarized according to the mean of age grouping, $<$ or $>$ 13 years, gender, parent occupation, age of children at onset, level of children’s education, severity, and clinical types of TC using the independent sample *t*-test for numeric variables. The data of CDLQI application was used for reliability analyses. Internal consistency was tested using the Cronbach α value, a value >0.70 was conventionally considered acceptable. Item-score and total-score relationships was explored using the Spearman correlation analysis. The test-retest reliability or reproducibility, which measures the stability of a measuring instrument,

was conducted and an interclass correlation coefficient of >0.75 was taken as acceptable limit. Discriminant validity was tested using the SPSS canonical linear discriminant analysis to differentiate severity of TC from the mean of total CDLQI. An independent physician assessed severity of TC based on a scale of mild, moderate, and severe disease. By using the Spearman’s rank correlation, researchers determined the association between demographic variables such as age, gender, parent occupation, parent income, the subject level of education, and the subscales of CDLQI. Similarly, association between clinical variables such as age at onset, duration of TC, family and atopy history, and the subscales of CDLQI was determined using spearman’s rank correlation. The associations between the total CDLQI score of the correlated subscales and categorized age and education were compared using one way analysis of variance (ANOVA) and Fisher’s least significant difference (LSD) post hoc test as appropriate. A 5% significance level was chosen for two-sided tests.

Results

The socio-demographic characteristics of the validated population sub-sample were similar to that of the study population (Table 1). There was no statistically significant difference between the study group and the control population in terms of age ($P = 0.432$), gender ($P = 0.792$), and education ($P = 0.238$). The mean ages \pm SD of study group and control population were 7.31 ± 2.52 and 7.40 ± 2.43 years, respectively. TC was more common among boys than girls (70.8% vs. 29.2%), it occurred predominantly below teenage years (95.7% vs. 4.3%), and most children affected were enrolled in primary education (94.1% vs. 5.9%). Among the subjects, TC was identified at a mean age of 5.2 ± 2.04 years and the mean duration of TC infection was 0.6 ± 1.03 years at the time of survey. Most children had moderate to severe case of the disease, with a mean disease severity of 2.11 (range 1–3; Table 1).

The Yoruba version of the CDLQI was found reliable with internal consistency reliability coefficients (Cronbach α) for the 6 items subscales, ranging from 0.75 (symptoms and feelings) to 0.82 (treatment and personal relationship). For the total CDLQI scale, Cronbach α was 0.80. Test-retest reliability coefficient (Pearson’s correlation coefficient) was high for most

**Table 1.** Socio demographic and clinical variables in relation to mean CDLQI \pm SD.

Variables	Patients (n = 185)	P-value
Mean CDLQI by age grouping		
<13 years: n = 174 (94.05%)	7.05 \pm 3.02 {3–18}	0.039
\geq 13 years: n = 11 (5.95%)	9.00 \pm 2.86 {6–14}	
Mean CDLQI \pm SD by gender		
Male: n = 131 (70.8%)	6.85 \pm 2.69 {3–15}	0.037
Female: n = 54 (29.2%)	7.86 \pm 3.60 {3–18}	
Mean CDLQI by parent's occupation		
Predominantly farmer: n = 144 (77.84%)	7.21 \pm 2.94 {3–18}	0.733
Predominantly self employed/civil servants: n = 41 (22.16%)	7.02 \pm 3.36 {3–14}	
Mean CDLQI \pm SD by age at onset		
<5 years: n = 96 (51.89%)	6.72 \pm 2.80 {3–14}	0.036
>5 years: n = 89 (48.11%)	7.65 \pm 3.21 {3–18}	
Mean CDLQI \pm SD by education level		
Primary education: n = 174 (94.05%)	7.10 \pm 3.09 {3–18}	0.254
Secondary education: n = 11 (5.95%)	8.18 \pm 1.60 {6–18}	
Mean CDLQI by tinea capitis severity {range}		
1 = Mild: n = 33 (17.84%)	3.73 \pm 0.45 {3–4}	<0.001
2 = Moderate: n = 98 (52.97%)	6.24 \pm 0.77 {3–7}	
3 = Severe: n = 54 (29.19%)	10.91 \pm 2.78 {8–18}	
Mean CDLQI by clinical types {range}		
Seborrheic dermatitis: n = 18 (9.73%)	6.39 \pm 1.88 {4–13}	0.437
Black dot: n = 77 (41.62%)	7.05 \pm 3.38 {3–18}	
Gray patch: n = 86 (46.49%)	7.36 \pm 2.87 {4–14}	
Pustular: n = 4 (2.16%)	8.75 \pm 3.78 {6–14}	

subscales including symptoms and feelings ($r = 0.85$), school and holiday ($r = 0.75$), sleep ($r = 0.76$), and treatment (0.75). It was low, however, for leisure ($r = 0.44$) and personal relationship ($r = 0.11$). The reliability coefficient for the total score was 0.96. The Yoruba version of the CDLQI also demonstrated positive and significant validity in discerning severity of skin diseases. A discriminant analysis was performed to know the relationship between physician assessed severity of TC and CDLQI. The analysis showed a discriminant function with an Eigenvalue of 3.57 (canonical correlation, $r = 0.88$; $\chi^2 = 276.265$; $df = 2$; $P < 0.001$).

In our study, the mean of total CDLQI was higher for children with TC than for the control, 7.17 ± 3.03 vs. 0.00 ± 0.00 ($P < 0.001$). The study reveals there was an increase in the total CDLQI score as the age of children increased, such that teenagers had higher mean scores than younger children ($P = 0.039$; Table 1). Girls also had significantly higher mean \pm SD CDLQI scores than boys ($P = 0.037$). Children born to farmers had higher mean CDLQI scores than children of non-farmers,

however this difference was not statistically significant ($P > 0.733$). The children who developed TC after age of five years had statistically significant higher mean scores and life impairment than those who had TC before the age of five ($P = 0.036$). However, no significant difference in CDLQI scores of children in primary and secondary school were noted ($P = 0.254$, Table 1).

From the physician rated TC severity, children with moderate TC ($n = 98$) had a higher mean score than those with mild incarnation of the disease ($n = 33$). Those with severe TC ($n = 54$) also demonstrated higher mean score than those with moderate TC ($n = 33$; $P < 0.001$). Figure 1 shows the positive correlation which exists between total CDLQI and disease severity (Spearman rho = 0.8, $P < 0.001$).

Although the Gray patch or epidemiologic type of TC ($n = 86$) was more prevalent than the other types, the pustular type ($n = 4$) had the statistically insignificant highest mean score in comparison to the other types including black dot type ($n = 77$) and seborrheic dermatitis type ($n = 18$) ($P = 0.437$, Table 1).

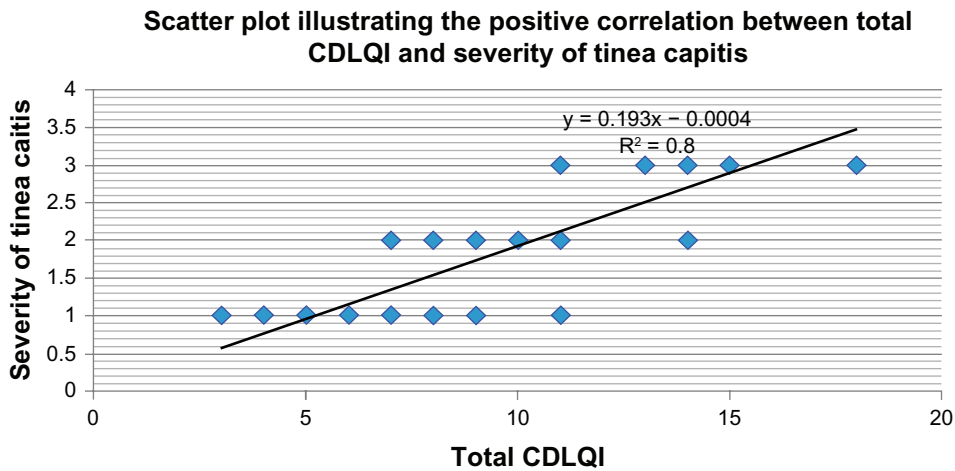


Figure 1. Scatter plot illustrating the correlation between total CDLQI and severity of tinea capitis. Correlational Constant (R^2) = 0.8. **Notes:** Spearman rho = 0.8; $P < 0.001$; 2 correlation is significant at 0.01 level (2 tailed).

The mean \pm SD of the subscale scores were highest in the symptoms and feelings axis for both the patients and control than for the other axes (3.50 ± 1.351 vs. 0.13 ± 0.352 respectively). The children with TC had significantly higher scores than the control group for symptoms and feelings (axis 1 and 2; $P < 0.001$), leisure (axis 4, 5 and 6; $P < 0.001$), personal relationship (axis 3 and 8; $P < 0.001$), school and holiday (axis 7; $P = 0.002$), and for sleep (axis 9; $P = 0.006$) (Table 2). Among the children with TC, symptoms and feelings had the highest mean CDLQI at 3.50 ± 1.351 , and contributed most to QoL impairment. The mean of total CDLQI score was lowest for the sleep axis at 0.09 ± 0.451 . The difficulty with treatment also contributed significantly to life impairments when compared to the controls (2.94 ± 0.392 vs. 0.00 ± 0.000 , $P < 0.001$). Personal relationship was the third most impaired aspect

of the subject’s life with a mean CDLQI score of 0.47 ± 1.188 ($P < 0.001$). Similarly, leisure, school activity or holiday time, and sleep were all significantly impaired when compared with the control group shown (Table 2).

In this study, further bivariate analysis showed age correlated positively with symptoms and feelings, and leisure subscales ($r_s = 0.2$, $P = 0.021$ and $r_s = 0.2$, $P = 0.013$, respectively) but not with any other CDLQI subscales. However, one way analysis of variance (ANOVA) with the leisure subscale showed older children had the highest mean CDLQI score when compared to other age groups ($F = 13.156$; $df = 2$; $P < 0.001$). Though symptoms and feelings subscale scores for ages 13–16 years was highest, Post-hoc analysis using the Fisher’s LSD test showed there was a statistically significant difference in the symptoms and feelings scores

Table 2. Distribution of subscale scores of CDLQI and total CDLQI score of children with tinea capitis and control.

Total score and subscale scores of CDLQI	TC group CDLQI score (mean \pm SD)	Control group CDLQI score (mean \pm SD)	t-value	P-value
Symptoms and feelings (axis 1 and 2)	3.50 ± 1.351	0.13 ± 0.352	32.891	<0.001
Leisure (axis 4, 5 and 6)	0.39 ± 1.103	0.00 ± 0.000	4.862	<0.001
School or holidays (axis 7)	0.11 ± 0.503	0.00 ± 0.000	3.067	0.002
Personal relationships (axis 3 and 8)	0.47 ± 1.188	0.00 ± 0.000	5.380	<0.001
Sleep (axis 9)	0.09 ± 0.451	0.00 ± 0.000	2.771	0.006
Treatment (axis 10)	2.94 ± 0.392	0.00 ± 0.000	101.901	<0.001
Total CDLQI score	7.17 ± 3.034	0.00 ± 0.000	32.132	<0.001



between younger children (non-teenagers) ages 5–8 years and 9–12 years, and older children (teenagers) ages 13–16 years ($P = 0.01$).

The education level was positively correlated with symptoms and feelings ($r = 0.2$, $P = 0.018$) and leisure ($r = 0.2$, $P = 0.004$). Children in secondary school have higher mean scores for symptoms and feelings and leisure subscales. However, the difference in the means of the scores across the education level strata was only significant for leisure ($P = 0.021$) (Table 3).

Spearman's rank correlation indicated that scalp pruritus and adenopathy inversely correlated with the symptoms and feelings subscale ($r_s = -0.2$, $P < 0.01$ and $r_s = -0.2$, $P < 0.01$, respectively). There was also a significant inverse relationship between leisure and alopecia, ($r = -0.2$, $P = 0.005$), leisure and age at onset of TC ($r_s = -0.24$, $P = 0.001$), and the clinical types of TC ($r_s = -0.3$, $P < 0.001$). There was also negative correlation between personal relationships and alopecia ($r_s = -0.2$, $P = 0.003$), and sleep and clinical type of TC ($r_s = -0.15$, $P = 0.049$). Scalp pruritus, atopy history ($P < 0.05$), and alopecia ($P < 0.01$) are positively correlated with total CDLQI (Table 3).

Discussion

To the best of our knowledge, this community based cross sectional study is the first that examines the impacts of TC on the children's QoL. The reliability

of the Yoruba version of the CDLQI is good and is close to that of Turkish version, as reported by Didem et al⁸ in a cross validation study. Similarly, the overall test-retest was significant and produced results similar to the findings of the Lewis-Jones and Finlay.⁷

TC could be recurrent and thus become a chronic disease which may spontaneously resolve at puberty. However, it could also be associated with stigma and psychological disturbance amongst children. In this study, the mean \pm SD of total CDLQI score observed (7.17 ± 3.03) was significantly higher among the children with TC than the controls ($P < 0.001$). It is also slightly higher than the value obtained from the initial evaluation and practical use of the instrument (5.1 ± 4.9),⁷ but closer to the value found in a Didem et al's study (6.71 ± 5.17).⁸

As reported in previous studies that examined the impact of other diseases on QoL, socio-demographic factors such as age and education level were recognized factors affecting the children's QoL. In the present study, children with symptoms of TC after 5 years, as well as those who were still nursing the infection as teenagers, had higher QoL impairment than their younger peers. This same group of adolescents was also likely to be in the high school and are likely to feel the impacts of the symptoms most. Their interpersonal relationships and leisure were impaired because of embarrassment arising from scaly and itchy scalp.

Table 3. Correlation between demographic variables, clinical variables and subscale scores of CDLQI.

	CDLQI subscales						
	S/F*	LES*	S/H	REL	SLP	TRM	TTS
Demographic factors							
Age	S/F*	LES*	S/H	REL	SLP	TRM	TTS
Sex	S/F	LES	S/H	REL	SLP	TRM	TTS
Parent occupation	S/F	LES	S/H	REL	SLP	TRM	TTS
Religion	S/F	LES	S/H	REL*	SLP	TRM	TTS
Pupil education level	S/F*	LES**	S/H	REL	SLP	TRM	TTS
Average monthly income	S/F	LES	S/H	REL	SLP	TRM	TTS
Clinical factors							
Scalp scaling	S/F	LES	S/H	REL	SLP	TRM	TTS
Scalp pruritus	S/F**	LES	S/H	REL	SLP	TRM	TTS**
Alopecia	S/F	LES**	S/H	REL**	SLP	TRM	TTS*
Adenopathy	S/F**	LES	S/H	REL	SLP	TRM	TTS
Clinical types TC	S/F	LES**	S/H	REL	SLP*	TRM	TTS
Age at onset of TC	S/F*	LES**	S/H	REL	SLP	TRM	TTS*
Duration of TC	S/F	LES	S/H	REL	SLP	TRM	TTS
History of atopy	S/F	LES	S/H	REL	SLP	TRM	TTS**

Notes: * $P < 0.05$; ** $P < 0.01$.

Abbreviations: S/F, Symptoms and Feelings (Axis 1 and 2); LES, Leisure (Axis 4, 5 and 6); S/H, School or Holidays (Axis 7); REL, Personal Relationships (Axis 3 and 8); SLP, Sleep (Axis 9); TRM, Treatment (Axis 10); TTS, Total CDLQI Score.



It is understandable that at this age adolescents are usually undergoing development of secondary sexual characteristics, and hence body image, social interaction, and self-evaluation become highly important to them. This finding is consistent with documentation of other workers.^{9,10} Similarly, in a recent study Gelfand et al¹¹ found age as an important contributor to QoL impairment. In their study, the negative effects of psoriasis was greatest among those who are younger than the adults.

Although statistically insignificant, girls had higher mean CDLQI scores and impaired QoL than boys. This cannot be unrelated to the fact that girls are usually more concerned with their physical appearance than boys. Within this culture, the female child may have to keep their hair grown for plaiting. Infection with TC at this age may compromise this expectation from the female child and impair their QoL. Previous studies are, however, inconsistent about the impacts of gender on QoL. Hon et al¹² reported that among children with atopic dermatitis, girls were more concerned with physical appearance, especially in issues of clothing and shoes, than boys. Alternatively, while Lundberg et al¹³ and Chernyshov¹⁴ reported gender differences in self-reported QoL, they noted no differences in parentally assessed QoL among children with idiopathic juvenile arthritis and atopic dermatitis, respectively.

The total CDLQI score was found to be correlated with physician assessed severity of TC; patients with severe disease had the highest score and impairment of QoL. Such association has also been demonstrated among children with atopic dermatitis.¹⁵ The children with clinically severe types of TC (inflammatory/pustular type) demonstrated higher QoL impairment than children with milder forms of the disease. This can be attributed to the fact that the pustular form of TC is more unsightly and therefore comes with more physical debility than the other types. The study also demonstrated a correlation between history of atopy and QoL impairment. This may be important because presence of atopy may determine the chronicity of tinea infection.¹⁶

In this study, disease variables such as alopecia, scalp pruritus, and adenopathy contributed significantly to the impairment of the symptoms and feelings domain of CDLQI. As the most obvious symptom or sign of TC, alopecia could contribute to

the change in body image, self-consciousness, poor social acceptance, physical avoidance, impairment of mobility and avoidance of activities that readily give them joy.¹⁷ Alopecia is also known to be of strong psychological consequences and impairs QoL by negatively impacting self-awareness prominently among women.¹⁸ Liakopoulou¹⁹ reported more psychological problems including anxiety, depression, aggression, self-withdrawal, and delinquent tendencies among children with alopecia areata than the control. The present study shows that scalp pruritus also contributes to QoL impairment among children with TC as it is associated with embarrassment, emotional upset, sadness, and self-consciousness. Other studies have also proven pruritus to be an important factor affecting the QoL.²⁰ Pruritus as a cutaneous equivalent of pain has been associated with development of symptoms of depression, global distress, and sleep impairment.²¹ Similarly, studies have shown that skin diseases have a profound effect on people's lives whether due to itching, unacceptable appearance, or restrictions caused by lesions or treatment, significant impact on social relations, psychological status, and the day-to-day activities of patients.^{3,7,22}

Although scalp itching in TC is said to be variable,²³ pruritus associated with TC in this study was not severe enough to impair children's sleep, however did impair the emotion life of the children. This study reports mild to moderate pruritus which does not affect school activities or their holidays significantly, though pruritus has been proven to have tendencies causing tiredness, irritability, and poor performance at school as well as disrupt learning.²⁴

In general, our observations in this study are comparable to findings of other authors.^{8,25} The first two domains of CDLQI were found to be the most important contributors to QoL impairment in similar studies among atopic children by Tassiana et al²⁶ and by Agneta²⁷ in Sweden among children with congenital ichthyosis, though with higher mean CDLQI score.

The difficulty with treatment for Ilie children was next in rank as a significant factor in the QoL impairment among children with TC. This may be partly due to the scarcity of dermatologists in our environment and the lack of established community and school dermatological services. Most parents use various local treatments instead, during which



children may suffer various physical and emotional traumas. Such common local treatment practice in our region includes forced scrapping until blood is drawn from the site of TC, and caustic application that inflicts pain.

Overall, children with TC demonstrated a higher QoL score, suggesting impairment, than their relatively healthy control counterparts. Other studies are needed to compare the impact on QoL of TC with other chronic diseases and to determine its impacts on the family members.

Conclusion

The factors that affect QoL among children with TC include age at onset, level of education, severity of disease, and clinical type of TC. Patients' feelings of embarrassment or sadness from symptoms of TC, such as itching, alopecia, adenopathy, and various problems arising in the course of treatment also contributed significantly to QoL impairment.

Limitations of the study

The reliability of the questionnaire in healthy individuals in this study was poor (zero score in almost all the domains), calling for caution in the interpretation of the findings of the study, particularly those related to the healthy controls.

Recommendations

Further study is necessary to compare the impairment of QoL by TC with other dermatologic diseases and other chronic childhood illnesses.

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Author Contributions

Conceived and designed the experiments: AOA, OAO, OO, ADM. Analyzed the data: AOA. Wrote the first draft of the manuscript: AOA. Contributed to the writing of the manuscript: AOA, OAO, OO, ADM. Agree with manuscript results and conclusions: AOA, OAO, OO, ADM. Jointly developed the structure and arguments for the paper: AOA, OAO,

OO, ADM. Made critical revisions and approved final version: AOA, OAO, OO, ADM. All authors reviewed and approved of the final manuscript.

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Disclosures and Ethics

As a requirement of publication the authors have provided signed confirmation of their compliance with ethical and legal obligations including but not limited to compliance with ICMJE authorship and competing interests guidelines, that the article is neither under consideration for publication nor published elsewhere, of their compliance with legal and ethical guidelines concerning human and animal research participants (if applicable), and that permission has been obtained for reproduction of any copyrighted material. This article was subject to blind, independent, expert peer review. The reviewers reported no competing interests.

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