

Oral health related quality of life and satisfaction with dental condition of school age children with dental pain in Ibadan, Nigeria

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Research

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Abstract

Background: Pain of dental origin is a major reason why school age children seek dental care in low resource settings but how it affects their oral health related quality of life and satisfaction with dental condition remains under researched. The aim of the study was to determine the impact of dental pain on oral health related quality of life as well as its association with satisfaction with dental condition of school age children in Ibadan, Nigeria.

Methods: This cross-sectional study was conducted among 1006 pupils aged 9-12 years who attended randomly selected primary schools in Ibadan, Nigeria. An interviewer administered questionnaire, Child– Oral Impact on Daily Performances inventory (C-OIDP) in addition to oral examination was used to obtain data. Analysis was done with SPSS version 23 and p value < 0.05 was considered significant.

Results: The prevalence of self-reported dental pain was 10.2%. The mean C-OIDP score was 2.6 (± 7.2) overall and 9.8 (± 12.4) for pupils with pain. There was higher impact on oral health related quality of life of respondents who reported dental pain than those who did not (Mean Rank = 749.54 vs 475.4, U = 21162, Z = -12.724, p < 0.001) compared to those with and without clinically assessed pain (Mean Rank = 541.21 vs 502.97, U = 6416, Z = - 0.692, p = 0.489). Those who reported dental pain were more dissatisfied with their dental condition (OR = 7.7, CI = 5.0 – 12.0, P < 0.001) compared to those with clinically assessed dental pain (OR = 1.3, CI = 0.4 – 4.9, p = 0.687). Children with self-reported dental pain and who were dissatisfied with their dental condition reported highest odds of impairment in maintaining social contact (OR = 6.5, CI = 0.7 - 58.3, p = 0.093).

Conclusion: Self-reported dental pain significantly impacted the quality of life of the pupils and caused dissatisfaction with dental condition when compared to clinically assessed pain.

Background

Pain is commonly associated with many oral diseases in both children and adults. Dental pain is a sequela of oral diseases such as dental caries, traumatic dental injuries among others in children [1–3]. The prevalence of dental pain among children varies across the globe with prevalence rates as high as 64.1% documented among children aged 8 to 12 years in Nigeria [1], 47.5% reported among 8 year olds in England [4] and 33.7% among Brazilian children aged 12–13 years [2]. Factors such as socioeconomic class and demographic characteristics have been shown to influence the occurrence and perception of dental pain [1, 5–8]. Pain of dental origin has been reported as the predominant reason for accessing dental care services among children in low resource settings [9, 10].

Dental pain has been associated with impaired quality of life [2, 11, 12]. It has negative impacts on physical, functional and psychosocial domains of oral health related quality of life (OHRQoL) in children [4, 11, 12]. Although the impact of dental pain on the oral health related quality of life of children has been investigated, [1, 11–15], little is known about how dental pain affects satisfaction with dental condition among them. In addition, the relationship between the satisfaction with dental condition of

children and the domains of oral health quality of life of those in pain remains under researched. This research gap is noteworthy more so, dental care seeking behaviour is likely influenced by self-perception of dental pain [9, 16, 17] and invariably self-assessment of oral health.

Self-assessment or subjective assessment of oral health such as self-rating of oral health and satisfaction with dental condition are useful for summarising oral health status [18, 19]. They may complement clinical indices to provide holistic care in clinical and non-clinical settings [20]. There is however, sparse information about satisfaction rating of oral condition in children both in clinical settings and the community making this study important. Investigating how satisfaction rating with dental condition among children affects overall OHRQoL and its association with dental pain will facilitate understanding the applicability of these subjective assessment tools in children. It will also provide insights on the effects of pain on children's satisfaction with their oral condition. In addition, it will also shed light on the daily activities that must be impaired to cause dissatisfaction with oral condition among children with dental pain in clinical settings and in programme monitoring or evaluation. This study, therefore, assessed the impact of dental pain on the oral health related quality of life and its association with satisfaction with dental condition among 9 to 12-year-old pupils in Nigeria.

Methods

Study design

A cross-sectional study was conducted among school pupils aged 9–12 years attending randomly selected public schools in Ibadan metropolis.

Sample size

The sample size for the study was calculated using a sample size formula for cross-sectional studies [21]. A prevalence of 64.1% for self-reported dental pain obtained from a previous study [1], a power of 80%, confidence interval of 95% and accuracy of 3% inputted into the formula generated a minimum sample size of 982.

Sampling

The pupils recruited for the study were selected through multistage random sampling technique. The first stage involved selection of 18 primary schools from the list of 338 schools obtained from the State Ministry of Education through the use of a table of random numbers. The second stage involved selection of 9 to 12-year-olds within each selected school. The list of pupils in the fourth and fifth grades aged 9 to 12 years in each school was obtained from the school register from which a total number of 56 pupils were randomly selected. Thus, a total of 1008 pupils were approached for the study. The purpose of the study was explained to them and each pupil took home a consent form (in English Language and the translated form in the local language) through which information about the purpose of the study was explained to their parents. Consent was obtained from the parents of each pupil before recruitment into

the study. Only pupils who were available at the time of the study and gave assent participated in the study. Those who were ill were excluded from the study.

Ethical consideration

Ethical approval for the study was obtained from the State Research Ethics Committee. Permission was also sought and obtained from the State Ministry of Education and from the head teachers of participating schools.

Data collection

Information on dental pain and its impact on the oral health related quality of life was assessed with the use of an interviewer administered questionnaire. The questionnaire contained items on the sociodemographic characteristics of the pupils. The questionnaire enquired "if they were experiencing pain from their teeth at the time of the study and in the preceding four weeks". This was assessed on a graded pain severity scale of 1 to 10 with 10 as the worst pain. The impact of dental pain on the OHRQoL was assessed with the Child-Oral Impact on Daily Performances (C-OIDP) inventory that had been validated in the country [22]. The total C-OIDP score was obtained by multiplication of the frequency and severity scores for each pupil. In addition, satisfaction with the condition of the mouth of each participant was assessed and the response was recorded either as "satisfied" or "dissatisfied". Presence or absence of tenderness to gentle percussion of tooth/teeth was evaluated by a trained and calibrated dentist with a wooden spatula [23]. The intra examiner's kappa score was 0.9. A pilot study was conducted prior to the study among children aged 9 to 12 years in a school that was not included in the study to determine the feasibility of the study and comprehensiveness of the questionnaire. The theoretical framework for the study was adapted from the WHO International Classification of Impairments, Disabilities and Handicaps that was modified for dentistry by Locker [24]. It forms the theoretical framework for C-OIDP [25]. For this study, the effect of the intermediate level, which dental pain falls into, was considered. The intermediate level recognises the earliest negative effect of impairment of oral health status (first level).

Sociodemographic characteristics; age, gender and parental occupational class of the respondents, were considered confounders of pain perception. Dental pain was considered as exposure that could have negative impacts on satisfaction with dental condition as well as daily performances from the C-OIDP domains. The study investigated the relationship between satisfaction with dental condition, daily performances among those with dental pain and the ultimate impact on the overall quality of life. The primary outcome was the overall quality of life and the daily performances. The secondary outcome was dissatisfaction with dental condition and confounders.

Data analysis

Data obtained was collated and subjected to statistical analysis using SPSS version 23. Categorical variables were summarised using percentages and proportions. Continuous data were summarised with mean, standard deviation and 95% confidence interval. The initial analysis was done between sociodemographic characteristics of respondents and pain using chi square. Test of association between

C-OIDP items, C-OIDP score (overall quality of life) and pain were done using Mann Whitney U statistics (median used as descriptive statistics) due to skewness of data. To assess the association between the C-OIDP items, pain and satisfaction with dental condition, bivariate analysis was done using chi square statistics (model 1). Multivariate analysis was conducted, subsequently, using logistic regression to determine the association between satisfaction with dental condition and C-OIDP variables among respondents with pain. Results of model 1 that were significant at $p \leq 0.1$ were entered into the second model. Odds ratio and 95% CI was reported as an effect size modification. Association between C-OIDP score and pain assessment types (self-reported and clinically assessed) was done separately using binary logistic regression. A p value < 0.05 was considered to be statistically significant.

Results

A total of 1006 pupils participated in the study out of the 1008 approached for recruitment i.e. a response rate of 99.8%. The mean age of the participants was 10.5 (SD = 1.1) years and 478 (47.5%) were females. One hundred and three (10.2%) reported dental pain, while 14 (1.4%) had at least a tooth that was tender to percussion on oral examination. The majority (83.0%) were satisfied with the condition of their mouth.

The standardised Cronbach alpha value of the C-OIDP scale was 0.94 and when each of the items of the scale was deleted the Cronbach alpha value was reduced suggestive of the importance of each item of the C-OIDP scale. Inter-item correlation coefficient ranged from 0.2 to 0.9.

A total of 212 (21.1%) pupils had at least an impact of oral health on their quality of life. The C-OIDP score ranged from 0 to 63. The mean C-OIDP score was 2.6 (± 7.2) overall, 9.8 (± 12.4) for pupils with self-reported dental pain and 3.6 (± 7.8) for those with clinically assessed dental pain. The median C-OIDP value was 0 overall and for pupils with clinically assessed dental pain. While median C-OIDP value was 6.0 for those with self-reported dental pain.

There was no difference in the proportion of the pupils by age, gender and parental occupation class with or without dental pain. Seventy-one (68.9%) pupils with self-reported dental pain reported at least an impact on quality of life compared with 141 (15.6%) of those without dental pain ($X^2 = 158.07$, $p < 0.001$).

Respondents who reported dental pain had higher impairment of oral health related quality of life with higher ODP Mean Ranks compared to those who did not (Table 1).

Table 1

Self-reported pain and impacts on the oral health related quality of life with C-OIDP items

C-OIDP Item	Self-reported dental pain	Mean rank	U	Z	p value
Eating /enjoying food	Yes	734.2	22744.5	-13.035	< 0.001*
	No	477.2			
Speaking/pronouncing words	Yes	604.9	36061.0	-7.969	< 0.001*
	No	491.9			
Cleaning of the teeth	Yes	718.6	24348.5	-12.273	< 0.001*
	No	479.0			
Sleeping and relaxing	Yes	613.2	35204.5	-9.562	< 0.001*
	No	491.0			
Smiling/showing teeth	Yes	598.5	36716.0	-7.791	< 0.001*
	No	492.7			
Emotional stability	Yes	598.3	36745.0	-9.754	< 0.001*
	No	492.7			
Doing school work	Yes	538.5	42903.5	-5.614	< 0.001*
	No	499.5			
Social contact	Yes	547.7	411952	-6.911	< 0.001*
	No	498.5			
OIDP Score	> 0	749.5	21162	-12.724	< 0.001*
	= 0	475.4			
* - Statistically significant U- Mann-Whitney U Test value					

(Insert Table 1)

Furthermore, all the OIDP items were affected by self-reportage of dental pain (Table 1). Respondents with clinically assessed dental pain also had higher impairment of oral health related quality of life than those who did not. All the C-OIDP items were negatively affected except for speaking where those with pain had lower mean ranks (Table 2).

Table 2

Clinically assessed dental pain and impacts on the oral health related quality of life with C-OIDP items

C-OIDP Item	Clinically assessed dental pain	Mean rank	U	Z	p value
Eating /enjoying food	Yes	596.1	5647	-1.834	0.067
	No	502.2			
Speaking/pronouncing words	Yes	499.4	6887	-1.113	0.910
	No	503.6			
Cleaning of the teeth	Yes	564.2	6094	-1.225	0.221
	No	502.6			
Sleeping and relaxing	Yes	543.4	6386	-1.223	0.221
	No	502.9			
Smiling/showing teeth	Yes	538.9	6449	-1.020	0.308
	No	503.0			
Emotional stability	Yes	552.9	6353	-1.788	0.074
	No	502.8			
Doing school work	Yes	529.9	6574	-1.454	0.146
	No	503.1			
Social contact	Yes	529.4	6581	-1.391	0.164
	No	503.1			
OIDP Score	> 0	541.2	6416	-0.692	0.489
	= 0	503.0			
U - Mann-Whitney U Test value					

(Insert Table 2)

Eating and enjoying food was the most frequently reported activity that was affected by pain (Table 3).

Table 3
Frequency of C-OIDP items affected by self-reported dental pain

Child–OIDP inventory	Number	%
Eating and enjoying food	149	37.0
Speaking and pronouncing words	112	27.8
Cleaning teeth	136	33.7
Smiling	73	18.1
Relaxing/sleeping	104	25.8
Emotional stability	78	19.4
Doing school work	67	16.6
Social contact	82	20.3
At least an impact	167	41.4

(Insert Table 3)

Many 835 (83.0%) of the respondents were satisfied with their dental condition and 171 (17.0%) were dissatisfied. A higher proportion (53.4%) of respondents with self-reported pain were dissatisfied with their dental condition than those without pain (12.8%), $p < 0.001$ (Table 4). Children who reported dental pain were more dissatisfied with their dental condition (OR = 7.7, CI = 5.0–12.0, $p < 0.001$) compared to those with clinically assessed dental pain (OR = 1.3, CI = 0.4–4.9, $p = 0.687$).

Table 4
Satisfaction rating of dental condition and pain

Dental pain	Satisfaction with dental condition		Total n (%)	χ^2	p value
	Satisfied n (%)	Dissatisfied n (%)			
Self-reported					
Yes	48 (46.6)	55 (53.4)	103 (100.0)	107.762	< 0.001*
No	787 (87.2)	116 (12.8)	903 (100.0)		
Clinically assessed					
Yes	10 (71.4)	4 (28.6)	14 (100.0)	1.348	0.275
No	825 (83.2)	167 (16.8)	992 (100.0)		
* Statistically significant					

(Insert Table 4)

A higher proportion of respondents with dental pain who had negative impacts on eating and enjoying food, cleaning teeth, sleeping and enjoying contact with other pupils were dissatisfied with their dental conditions than others (Table 5). Among children with dental pain; those who were dissatisfied with their dental conditions were more likely to report impairment in maintaining social contact (OR = 6.5, CI = 0.7–58.3, $p = 0.093$), teeth cleaning (OR = 3.4, CI = 0.7–16.0, $p = 0.121$), overall quality of life (OR = 2.5, CI = 0.4–3.4, $p = 0.361$), eating and enjoying food (OR = 2.1, CI = 0.5–10.0, $p = 0.335$), as well as sleeping (OR = 1.1, CI = 0.4–3.4, $p = 0.865$).

Table 5

Satisfaction rating of dental condition and impairment of the C-OIDP items of pupils with dental pain

C-OIDP Item	Satisfaction with dental condition		χ^2	p value
	Satisfied n (%)	Dissatisfied n (%)		
Eating and enjoying food				
No impact	23 (63.9)	13 (36.1)	6.646	0.010*
Negative impact	25 (37.5)	42 (62.7)		
Speaking and pronouncing words				
No impact	37 (50.0)	37 (50.0)	1.22	0.269
Negative impact	11 (37.9)	18 (62.1)		
Cleaning teeth				
No impact	27 (64.3)	15 (35.7)	8.912	0.003*
Negative impact	21 (34.4)	40 (65.6)		
Smiling				
No impact	39 (51.3)	37 (48.7)	2.589	0.108
Negative impact	9 (33.5)	18 (66.7)		
Relaxing/sleeping				
No impact	39 (52.7)	35 (47.3)	3.931	0.047*
Negative impact	9 (31.0)	20 (69.0)		
Emotional stability				
No impact	38 (48.1)	41 (51.9)	0.580	0.306
Negative impact	10 (41.7)	14 (58.3)		
Doing school work				
No impact	46 (48.9)	48 (51.1)	2.355	0.125
Negative impact	2 (22.2)	7 (77.8)		
Social contact				
No impact	47 (51.1)	45 (48.9)	6.964	0.008*
Negative impact	1 (9.1)	10 (90.9)		
*Statistically significant				

C-OIDP Item	Satisfaction with dental condition		χ^2	p value
	Satisfied n (%)	Dissatisfied n (%)		
OIDP Score				
= 0	20 (62.5)	12 (37.5)	4.715	0.030*
> 0	28 (39.4)	43 (60.6)		
*Statistically significant				

(Insert Table 5)

Discussion

The study showed that self-reported pain negatively impacted on the oral health related quality of life of children aged 9 to 12 years and associated with dissatisfaction with dental condition. The impact of self-reported pain on the oral health related quality of life does not differ from findings by other authors [1, 4, 11, 14]. In addition, children who reported dental pain had six folds' negative impact on their quality of life when compared to other participants. This is a reflection of the magnitude that dental pain has on affected children and a need to institute prevention strategies among school aged children to limit the impact of pain on their oral health related quality of life.

The daily activity that was most frequently affected by pain was "eating and enjoying food". This has been mentioned by others [26, 27]. The role of food in everyday living may be partially responsible for this finding. It is not surprising as the major role of the mouth known by adolescents in a similar setting is eating [28]. The next ranked activity affected by pain was "cleaning the teeth". Cleaning of the teeth requires touching of the teeth with tooth cleaning aid and as such a potential aggravating factor to elicit pain during the act of tooth cleaning. Other activities of the C-OIDP were also affected and included "speaking and pronouncing words", "sleeping and relaxing", "maintaining social contact", "maintaining emotional stability", "smiling" and the last being "doing school work". The finding of "doing schoolwork" as the least reported activity affected by pain may be alluded to the fact that school work is given priority by pupils, parents and teachers. In addition, missing school is usually not taken lightly by all concerned except the child is obviously ill, which often does not take into cognisance dental conditions.

There was little impact of clinically assessed dental pain on oral health related quality of life of respondents in the study compared to self-reported dental pain. This may be attributed to the different causes of pain evaluated by percussion of the tooth, which could be periapical pathology as is the case of vertical percussion and periodontal pathology with lateral percussion of the teeth [23]. Therefore, the causes of dental pain affecting these children may not be associated with any of the above listed pathologies. In addition, it is a pointer to the importance of individual assessment or perception of pain, which may differ significantly from that of the clinician's assessment.

More than half of the respondents who reported dental pain were dissatisfied with their dental condition. This finding is similar to that of a previous study where parents reported children's dissatisfaction with their oral conditions [29]. This is suggestive of the crucial role that dental pain plays in the perception of dental condition as being satisfactory or otherwise in children. It is thus worthy of note to clinicians as well as caregivers to place children's satisfaction with their dental conditions at the frontiers of management for a better treatment outcome. Importantly, it may explain the reason why pain is the main motivator for children who seek dental care in low resource settings [9, 10]. The impact of dental pain on the oral health related quality of life affected all the domains; physical, psychological and social. This is another likely explanation for the aforementioned dental care seeking behaviour as observed among children by previous authors [27]. Furthermore, the relevance of satisfaction ratings with dental condition in children in the monitoring and evaluation of population-based interventions and dental care programme cannot be over emphasized. These findings highlight the importance of dental pain as a negative factor that impacts on the oral health related quality of life of children and is also strong enough to cause dissatisfaction with their oral health condition.

"Eating and enjoying food", "tooth cleaning", "sleeping and relaxing" and "enjoying contact with other children" were the C-OIDP items that were more negatively impacted upon by pain and associated with dissatisfaction with dental condition. These finding suggests that the pupils rate the aforementioned activities highly. In addition, any negative impact or inability to engage in these activities, as in this case dental pain, influences their perception and results in eventual dissatisfaction with the state of their oral conditions. On multivariate analysis, "maintaining social contacts with other children" resulted in highest odds of being dissatisfied with dental condition followed by teeth cleaning. Importantly, these activities should be checked both in the clinic and field settings as the case may be to ascertain the success of treatments and interventions implemented. In addition, reporting dental pain by children resulted in almost eight folds of dissatisfaction with dental condition, which may make the application of the satisfaction rating of dental condition, a useful complementary tool in the monitoring and evaluation of dental pain both at the clinic level and in population-based interventions.

A limitation of the study was not evaluating the association of major oral diseases in children aged 9–12 years, such as dental caries, with pain and quality of life. This was not considered an objective of this study because it had been reported by other studies. Thus, we investigated the early effects of the disease (pain), a major complaint among this age group as well as the driving force for them to seek dental treatment.

Conclusion

Self-reported dental pain significantly impacted the quality of life of the pupils and caused dissatisfaction with dental condition when compared to clinically assessed pain.

Abbreviations

CI

Confidence interval

C-OIDP

Child Oral Impact on Daily Performances

OHRQoL

Oral health related quality of life

WHO

World Health Organization

Declarations

Ethics approval and consent to participate

Ethical approval for the study was obtained from the State Research Ethics Committee. Permission was also sought and obtained from the State Ministry of Education and from the head teachers of participating schools. Consent was obtained from the parents and assent from the pupils before recruitment into the study.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors have no competing interests.

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Authors' contributions

FBL conceptualized the study, wrote the initial proposal for the study, designed the questionnaire used for the study, coordinated data collection and analysis and wrote large parts of the manuscript. GAO

contributed to the study proposal, the design of the questionnaire and parts of the manuscript. Both authors read and approved the final version of the manuscript.

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Figures

Theoretical model

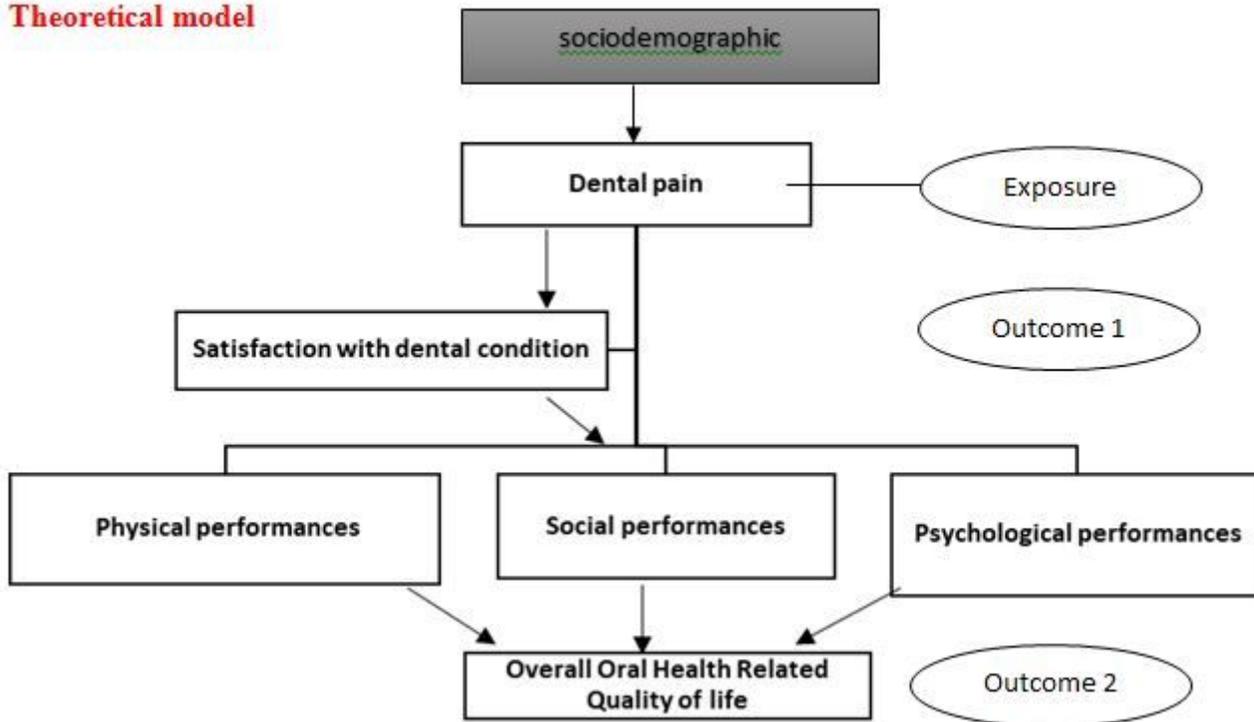


Figure 1

Theoretical model