Original Article

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Oral Health Impact Profile (OHIP-14) and its association with dental treatment needs of adolescents in a rural Nigerian community

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Abstract

Aim: To validate and determine the applicability of OHIP-14 in assessing the impact of unmet dental treatment needs on the quality of life of adolescents in a rural community. **Methods:** The OHIP-14 questionnaire and the Aesthetic component (AC) of Index of Orthodontic Treatment Need (IOTN) were data collection instruments in a cross sectional survey among students in a rural community. The reliability and validity of the OHIP-14 as well as the association between it and dental treatment needs including malocclusion was assessed. Data obtained was analyzed using Mann Whitney U Test. **Results:** The mean age of participants was 14.9 (±1.6) years. The OHIP-14 had acceptable Cronbach alpha value of 0.8. It could discriminate between respondents with or without dental treatment needs due to caries and dental trauma ($p < 0.001$). The OHIP-14 did not differentiate between respondents with or without orthodontic treatment need ($p = 0.808$). However, significant association existed between being irritable with people and unmet orthodontic treatment needs ($p = 0.032$). **Conclusion:** The OHIP-14 is a valid and reliable quality of life assessment tool in young adolescents in this rural community. However, only the social disability domain component discriminated significantly between those with or without orthodontic treatment needs.

Keywords: Quality of life. OHIP-14. Malocclusion. Dental treatment needs. Adolescents.

Introduction

The concept of Oral Health Related Quality of Life(OHRQoL), involves the use of multidimensional constructs that assess the absence or presence of negative impacts of oral health conditions and diseases on the day to day wellbeing of an individual[1,2]. OHRQoL was borne out of the paradigm shift from the assessment of oral health merely on the basis of clinical presence or absence of disease[3]. OHRQoL does not assess health solely from the standpoint of the managing physician who assesses clinical signs and symptoms as the major yardsticks, but primarily incorporates the subjective (self-perceived) opinion of the patient affected by the oral condition being assessed. The subjective assessment of the impact of oral conditions on quality of life has been found useful in the planning and evaluation of oral health programmes, dental care services and instituted treatments[4,5]. These tools are especially valuable in rural communities of developing countries where appropriate allocation, monitoring and evaluation of sparse resources are very important. The additional merit of providing insights into individuals' perception of the effect of oral diseases and conditions on their daily performances is of

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great value[6]. This is especially true as it has been established that the absence of perceived needs is a major factor for not utilizing dental services[3].

Rural communities in many parts of Africa are faced with inaccessibility to and poor utilization of dental care services and high unmet dental needs both in children and adults[7-10]. Children in these communities are noted to have poor oral hygiene and high prevalence of untreated dental caries[8,11,12]. Unmet dental needs due to dental caries have negative impact on the daily activities of children with functional domain mostly affected[13]. Oral conditions such as malocclusion have also been associated with impacts on the quality of life of affected individuals[14] and affecting the psychological and social domains most[15,16]. This is especially important among adolescents who are undergoing physical, psychological, emotional and social life changes, and are under various forms of pressure to be accepted by their peers, while maintaining their 'status' in the home front[17]. The effect of treating the aforementioned oral conditions have shown significant reduction or elimination of the self-perceived negative impact on the quality of life of those affected[13,18]. This is one of the major advantages of using quality of life measures. Numerous OHRQoL measures exist which have not been utilized in Nigerian rural communities. One of these is the Oral Health Impact Profile (OHIP-14), which is easy to use, and has been validated and found acceptable in many regions[19-21] as well as among adult Nigerians in an urban region[22]. The evaluation of this instrument for comprehensive use both in the adult and adolescent Nigerian population will require its validation, as well as the determination of its applicability in the young adolescent in rural communities with diverse cultural norms and values. The OHIP-14 has however been evaluated and documented among Brazilian adolescents where it was found to be valid and acceptable for assessing OHRQoL[23]. Its discriminative properties to determine adolescents' response to orthodontic treatment has also been previously assessed[23].

This study aimed to validate and determine the applicability of OHIP-14 in assessing the impact of unmet dental treatment needs on the quality of life of adolescents in a rural community in Nigeria.

Materials and methods

This is a cross sectional study conducted among secondary school students in randomly selected schools in a rural community in Southwestern Nigeria over a period of six weeks. A minimum sample size of 384 was calculated at 5% α-level ($Z_\alpha = 1.96$) and difference margin of 5% using maximum prevalence of 50% with the formula for cross sectional studies[24].

Following ethical approval from the State Ethics Review Committee, approval and permission to conduct the study in selected schools was obtained from the Local Inspector of Education and the Local Government Schools' Board. Schools from which students were recruited for the study were selected by simple random sampling technique through balloting from the list of schools within the community that was provided by the Local Government Central Schools' Board. The head teachers of the selected schools and class teachers of junior secondary school one to three (Grade 7-9) were approached, the purpose of the study was explained and permission to conduct the study was obtained. All Grade 7-9 students who were eligible for the study were approached and only those who assented and were available at the time of the study were recruited. Illness and negative parental consent led to exclusion from the study.

Instrument of data collection was OHIP-14 questionnaire, which comprises of 14 questions with two questions each under seven domains. The domains include; functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap[19]. Responses to the questions are based on a Likert scale which ranged from 0- "never" to 4- "very often". Variables also included in the questionnaire were: demographic variables and satisfaction ratings of teeth appearance and self- rating of tooth condition. The satisfaction ratings of tooth appearance assessed how satisfied the participants were with the appearance of their teeth with a response of "satisfied or dissatisfied". The self- rating of tooth condition assessed oral condition as being "good or poor". The satisfaction ratings and self-ratings of oral health were variables used to assess the construct validity of OHIP-14 in the respondents. The questionnaire was translated to Yoruba language by language professionals and back-translated by two independent research assistants with minimal modification required. The back-translated questionnaire showed that the true meaning of the domains of the OHIP-14 was preserved in the Yoruba version. Due to the significant language barrier in the rural community of interest, the Yoruba language translation of the questionnaire was pretested among 30 students from other schools different from those selected for the study to ascertain the feasibility of self-administration as well as its comprehensiveness. The Yoruba translation of the OHIP-14 was subsequently administered to the students assessed in this study. In addition to administration of the OHIP-14 questionnaire, oral examination was conducted by a trained examiner to determine the treatment needs of the participants. The orthodontic treatment need was assessed using the Aesthetic Component (AC) of the Index of Orthodontic Treatment Need (IOTN). The IOTN-AC scores were coded as:

- No orthodontic treatment need — AC grade 1-4
- Borderline need — AC grade 5-7
- Definite treatment need — AC grade 8-10

Need for orthodontic treatment comprised of AC scores (5-10); borderline grade (5-7) and definite treatment need grade (8-10) were coded together in this category.

Need for other dental treatments due to presence of dental caries and trauma were documented as "present or absent" and considered as "other unmet dental treatment needs".

The reliability of OHIP-14 for internal consistency was determined by Cronbach's alpha and its stability assessed by the intra-class correlation coefficient. The Cohen kappa statistics for the test re-test reliability was conducted among 20 students who had duplicate interviews at an interval of one week.

The total OHIP score for the respondents was calculated by adding the responses score for each item together to give a minimum score of 0 and maximum score of 56. An impact on the quality of life was considered at a response level of hardly

ever. The face validity of the OHIP-14 was determined by interviewing dentists, while the construct validity was assessed by the association between self-ratings of oral health and satisfaction of the participant with their OHIP-14 scores. The discriminant validity was determined by comparing OHIP-14 scores in those with or without treatment needs for malocclusion with OHIP-14 scores of subjects with or without treatment need as a result of dental caries and trauma.

Data collected were processed and analyzed with SPSS version 21. Test of association was done using Mann Whitney U statistics since the data was skewed. Level of significance was set at $<5\%$. Kappa statistics was used to determine test-retest reliability of OHIP-14 and cut off level for significance set at $p<5\%$.

Results

Overall, 395 students participated in the study. The mean age of the study participants was 14.9 (± 1.6) years. The male gender accounted for 222 (53.6%) of the participants, the rest were females.

Reliability of OHIP-14

The Cronbach alpha value for internal consistency of the OHIP-14 was 0.84. The inter item coefficient ranged from 0.1 to 0.6 with no negative values and intra class correlation coefficient was 0.83. Deletion of any of the items of the OHIP-14 resulted in lower Cronbach alpha values compared with the standardized alpha value (Table1).

Table1 - Internal consistency of OHIP-14

OHIP Item	Scale mean if item is deleted	Cronbach alpha if item is deleted
Trouble pronouncing words	3.06	0.825
Worsened sense of taste	3.10	0.826
Painful aching	2.90	0.836
Uncomfortable eating	3.03	0.824
Self-consciousness	3.14	0.827
Felt nervous	3.14	0.829
Diet been unsatisfactory	3.01	0.822
Meals interrupted	3.04	0.826
Difficulty to relax	3.16	0.825
Embarrassment	3.10	0.825
Irritable with other people	3.21	0.833
Difficulty doing school work	3.25	0.831
Life less satisfying	3.26	0.829
Unable to perform usual function	3.23	0.835
Scale mean	3.35	
Cronbach alpha		0.84

Validity of OHIP-14

The face and content validity was assessed by a team of dentists and the participants, and it was made known that the instrument assessed how oral health affected the daily activities of individuals, all questions were simple to understand and straightforward.

The construct validity as assessed by comparison of OHIP-14 scores with a proxy since there is no overall gold standard to evaluate the criterion validity. The OHIP-14 scores when compared with pain, self-perceived treatment need, global self-rating of oral health, satisfaction rating of oral health condition and tooth appearance were all statistically significant (Table 2). The mean and median OHIP-14 score was higher in participants who were dissatisfied with their oral health condition and tooth appearance, who rated their oral health poorly, perceived a need for dental treatment or experienced pain compared with those who did not report any of the aforementioned variables ($p<0.05$).

Table 2 - The discriminant and construct validity of the OHIP-14 questionnaire

Variable	OHIP-14 Mean (SD)	Median	P value
Self-rating of oral health			
Good	2.5 (± 4.6)	0.0	<0.001*
Poor	6.8 (± 8.0)	5.0	
Satisfaction ratings of oral condition			
Satisfied	2.7 (± 4.7)	0.0	<0.001*
Dissatisfied	6.4 (± 8.4)	3.0	
Satisfaction ratings of tooth appearance			
Satisfied	2.7 (± 5.0)	0.0	<0.001*
Dissatisfied	7.6 (± 7.5)	6.0	
Perceived need for treatment			
No	1.9 (± 4.1)	0.0	<0.001*
Yes	5.4 (± 6.8)	3.0	
Pain			
No	1.7 (± 3.4)	0.0	<0.001*
Yes	8.2 (± 7.8)	6.0	
Normative Orthodontic treatment need			
No	3.1 (± 5.3)	1.0	0.808
Yes	3.7 (± 6.2)	1.0	
Other Normative dental treatment needs			
No	3.0 (± 5.2)	0.0	<0.001*
Yes	6.5 (± 7.4)	6.0	
Categories of orthodontic treatment needs			
No need	3.1 (± 5.3)	1.0	0.920
Borderline	3.3 (± 5.2)	1.0	
Definite need	5.8 (± 9.6)	0.0	

*statistically significant with Mann Whitney U test

OHIP-14 and dental treatment needs

There were 157 (39.7%) respondents with "orthodontic treatment needs" of which 28 (7.1%) had definite orthodontic treatment needs. Thirty-nine respondents (9.9%) had "other dental treatment needs" due to dental trauma and caries. The OHIP-scores ranged from 0-37 with a mean score of 3.4 ± 5.7. The mean OHIP-14 score for those with "other dental treatment needs" was 6.5 ± 7.4, and was generally higher than mean score for those with "orthodontic treatment needs" (Table 2). Two hundred and two (51.5%) respondents perceived an impact on their quality of life due to oral diseases and conditions, while 155 (39.0%) had some form of need for orthodontic treatment as assessed by the aesthetic component of the IOTN. Mean OHIP scores increased with increased need for orthodontic treatment; however, this was not statistically significant. (Table 2)

A significantly higher proportion of respondents with "other dental needs" reported impacts on their quality of life from;

worsened sense of taste, painful aching, discomfort with eating, self-consciousness, nervousness, unsatisfactory diet, meals being interrupted, embarrassment, irritability, difficulty doing school work and inability to function (Table 3). However, the only significant impact effect as a result of unmet orthodontic treatment need was being irritable with people (Table 3).

Table 3 - relationship between the OHIP-14 questionnaire items and the various unmet dental treatment needs

OHIP Item	Orthodontic treatment need		P- value	Other dental treatment needs		P value
	Yes N (%)	No N (%)		Yes N (%)	No N (%)	
Functional limitation						
Trouble pronouncing words						
Impact	21 (13.4)	20 (8.4)	0.742	5 (12.8)	36 (10.1)	0.330
No impact	136 (86.6)	203 (81.6)		34 (87.2)	320 (89.9)	
Worsened sense of taste						
Impact	25 (42.4)	34 (57.6)	0.655	10 (25.6)	20 (5.6)	0.001*
No impact	132 (39.3)	204 (60.7)		29 (74.4)	336 (92.3)	
Physical pain						
Painful aching						
Impact	27 (17.2)	41 (17.2)	0.468	9 (23.1)	59 (16.6)	<0.001*
No impact	130 (82.8)	197 (82.8)		30 (76.9)	297 (83.4)	
Uncomfortable eating						
Impact	15 (9.6)	31 (13.0)	0.580	9 (23.1)	37 (10.4)	0.002*
No impact	142 (90.4)	207 (87.0)		30 (76.9)	319 (89.6)	
Psychological discomfort						
Self-consciousness						
Impact	12 (7.6)	12 (5.0)	0.122	6 (15.4)	18 (5.1)	0.001*
No impact	145 (92.4)	226 (95.0)		33 (84.6)	338 (94.9)	
Felt nervous						
Impact	15 (9.6%)	11 (4.6)	0.079	6 (15.4)	20 (5.6)	0.013*
No impact	142 (90.4)	227 (95.4)		33 (84.6)	336 (94.4)	
Physical disability						
Diet been unsatisfactory						
Impact	16 (10.2)	26 (10.9)	0.641	11 (28.2)	31 (8.7)	<0.001*
No impact	141 (89.8)	212 (89.1)		28 (71.8)	325 (91.3)	
Interrupted meals						
Impact	22 (14.0)	17 (7.1)	0.073	4 (10.3)	35 (9.8)	0.024*
No impact	135 (86.0)	221 (92.9)		35 (89.7)	321 (90.2)	
Psychological disability						
Difficulty to relax						
Impact	7 (4.5)	17 (7.1)	0.606	3 (7.7)	21 (5.9)	0.516
No impact	150 (95.5)	221 (92.9)		36 (92.3)	335 (94.1)	
Embarrassment						
Impact	14 (8.9)	15 (6.3)	0.676	7 (17.9)	22 (6.2)	0.023*
No impact	143 (91.1)	223 (93.7)		32 (82.1)	334 (93.8)	
Social disability						
Irritable with other people			0.032*	6 (15.4)	8 (2.2)	<0.001*
Impact	9 (5.7)	5 (2.1)		33 (84.5)	348 (97.8)	
No impact	148 (94.3)	233 (97.9)				
Difficulty doing school work						
Impact	4 (2.5)	10 (4.2)	0.581	3 (7.7)	11 (3.1)	0.020*
No impact	153 (97.5)	228 (95.8)		36 (92.3)	345 (96.9)	
Handicap						
Life less satisfying						
Impact	3 (1.9)	10 (4.2)	0.051	4 (10.3)	9 (2.5)	0.064
No impact	154 (98.1)	228 (95.8)		35 (89.7)	347 (97.5)	
Unable to function						
Impact	5 (3.5)	9 (3.8)	0.606	1 (2.6)	13 (3.7)	<0.001*
No impact	152 (96.5)	229 (96.2)		38 (97.4)	343 (96.3)	

*Statistically significant with Mann Whitney U test

Discussion

This study has observed that the OHIP-14 is a valid tool for assessing oral health related quality of life among this group of rural dwelling adolescents as it demonstrated a value for internal consistency higher than the recommended 0.7 value[25]. The construct validity is also of great value among these children as the OHIP-14 was able to detect significant difference in quality of life experiences among participants who required oral health intervention when compared to those that did not. In this study, the mean OHIP-14 scores were highest among people who felt pain and those who were dissatisfied with the appearance of their teeth followed by those who rated their oral health as being poor or were dissatisfied with their oral conditions. This is similar to finding in previous studies where higher impacts were observed when

self-perceived oral health was poor[26,27]. More participants in this rural community based study reported an impact of their general dental wellbeing on their quality of life than in a previous study among urban Nigerian children[28]. This is probably a reflection of the lower oral health utilization among rural dwellers in this environment with attendant higher disease burden[10,29].

In the present study, when 'other oral health needs' were compared to orthodontic treatment need however, the OHIP-14 had better discriminant value for assessing oral health related quality of life associated to caries and trauma than quality of life associated with malocclusion. Previous studies have reported weak relationship between orthodontic indices and OHRQoL tools[30,31]. This is partly because malocclusion itself is not necessarily a disease, but a series of deviations from the dental norm[1]. As a result, perception of need for treating malocclusion may be overlooked as long as functionality and aesthetics are not affected[32,33]. On the other hand, orthodontists view the occlusion more intensively than lay individuals do; and unless the malocclusion is critically severe, the patients' views may never match that of the orthodontist. The insignificant relation between the OHIP-14 and OHRQoL due to malocclusion in this study may also be attributed to the fact that rural children are less knowledgeable about malocclusion than urban children. Anosike et al., had reported more social impact on OHRQoL due to malocclusion among urban dwelling children than observed in this rural based study[28]. In addition, studies have reported that social class is a major factor among people seeking treatment of malocclusion[34,35]. Since most of these rural children are not from the high socioeconomic class, the low social status may also be a contributory factor. As a result of the aforementioned, these rural children cannot claim to be affected by a concept or condition they are not fully aware of. This argument poses a limitation on this study and needs to be verified by a study comparing OHRQoL experiences and malocclusion between urban and rural children. Another limitation is that only the aesthetic component of the IOTN was assessed in this study which does not necessarily impact on the objective functional capabilities of the adolescents assessed.

The social disability domain of the OHIP-14 detected that children who felt a need for orthodontic treatment were more irritable than those who did not and this agrees with a previous study of urban children where the psychosocial domain was most noted to impact on quality of life of the children as far as self-perceived orthodontic need was concerned[28]. This further emphasizes the social impact of malocclusion on OHRQoL of individuals.

In conclusion, the OHIP-14 is a valid tool for assessing OHRQoL of dental treatment needs as a result of caries and trauma among rural Nigerian children. However, it appears to be valid only in detecting the social impact of normative orthodontic treatment needs. Validating and assessing the applicability of other OHRQoL measures in this environment is recommended.

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