Validity and Reliability of Oral Impacts on Daily Performances Frequency Scale: A Cross-Sectional Survey among Adolescents

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Aim: *To examine reliability and validity of an abbreviated version of Oral Impacts on Daily Performances (OIDP) questionnaire and to analyze the interrelationship among OIDP scores, socio-demographic characteristics and oral health status among 12-15 year old adolescents in Davanagere city, Karnataka, India.* **Method:** *The descriptive cross-sectional survey was conducted among 900 adolescents aged between 12–15 years. The study subjects were randomly selected from six high schools. Selected subjects completed a survey instrument designed to measure subjective oral health indicators including the eight-item OIDP frequency scores. The study participants were clinically examined for dental caries and completed a self-administered questionnaire about demographic information and oral behaviors.* **Results:** *44% of the students reported at least one oral impact in the last six months. Cronbach's alpha for the OIDP frequency items was 0.81. Eating was the most common performance affected (33%) followed by cleaning teeth (22%) and speaking (20%). The severity of impacts was low for relaxing and carrying out works.* **Conclusion:** *The OIDP frequency score have acceptable psychometric properties in the context of an oral health survey among 12-15 year old adolescents.*
Keywords: *OIDP, dental caries, self reported, oral health measures*
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INTRODUCTION

The World Health Organization (1948) defines Health as a "state of complete physical, mental and social well being and not merely an absence of disease or infirmity and the ability to lead a socially and economically productive life".[1] For the field of dentistry, this new perspective on health suggested that the ultimate goal of dental care should not longer merely be seen as the absence of dental diseases; a patient's mental and social well being should be considered as well. In 1997, Locker outlined the shift from a disease centered, biomedical approach to a patient centered, bio-psycho-social approach in health care.[2] Based on this concept HRQoL measures can be categorized as:

generic or specific. The generic measures are used to evaluate the impact of general health problems on quality of life. The specific measures focus on the repercussions of particular health conditions, health problems or treatments on the quality of life.[3] The concept of "oral health related quality of life" (OHRQOL) captures the aim of this new perspective.

OHRQOL is a relatively new but rapidly growing phenomenon which has emerged over the past two decades.[4] Growing recognition of the importance quality of life in the field of Dentistry has since led to the development of a number of oral health related quality of life instruments.[5] Among all the OHRQOL instruments, Oral Impacts on Daily Performances (OIDP) is a scale which assesses impacts that affect individuals' daily life. Oral Impacts on Daily Performances (OIDP) instrument is advantageous for use in population surveys, not only in terms of being easier at the same time it measures behavior state rather than feeling state. It is based on an explicit conceptual framework, the World Health Organization's International Classification of Impairments, Disabilities and Handicaps, ICIDH,[6] which has been amended for dentistry by Locker.

Most studies using OHRQOL to assess oral impacts of the mouth and teeth have been on adults and elderly populations. Some authors have adapted and applied instruments developed for adults to children and adolescents.[7] However, there is a trend to generate specific indices which cater for the needs of younger populations.[8] The OIDP scale has been

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shown to have acceptable psychometric properties when applied to adult populations in Tanzania, Thailand, UK and Greece.[9–11] Among all the oral diseases dental caries is considered as a serious global health problem. Existing literature suggest that dental caries is high in Indian population.[12–16] A very extensive and comprehensive National Health Survey[17] conducted in 2004 throughout India has shown dental caries 53.8% in 12 year age group and 63.1% in 15 year-old teenagers. To date, there are no systematic OHRQOL studies of a large population-based sample of school going adolescents. Hence an attempt has been made to examine reliability and validity of an abbreviated version of the Oral Impacts on Daily Performances (OIDP) questionnaire and also to analyze the inter-relationship of OIDP scores, socio-demographic characteristics, dental caries experience and self reported oral health status among 12–15 year old adolescents.

MATERIALS AND METHOD

The present survey was a descriptive cross sectional survey, conducted to examine the reliability and validity of an abbreviated version of the oral impact on daily performances (OIDP) questionnaire and to analyze the interrelationship among OIDP scores, socio-demographic characteristics and oral health status among 12-15 year old adolescents. Six schools (out of 155 higher primary schools) were randomly selected by lottery method. The systematic sampling method was used for the selection of subjects. Sample size was calculated based on caries prevalence of 12-15 year olds in Davanagere city (DMFT 3.3).[16] Power of the test is 1-β (where β is fixed at 0.2). It yielded a sample size of 874, which was rounded off to 900.

The study had two aspects: Administration of a questionnaire followed by the clinical examination. The OIDP questionnaire was the measure of oral health related quality of life used in this study. The OIDP assesses oral impacts on the following daily performances: eating, speaking, cleaning teeth, smiling, emotional stability, relaxing, doing schoolwork, and social contact.

The methods used to translate the questions in the OIDP index to Kannada and to adapt the index to the Indian culture followed published guidelines.[10] The process of translation involved several steps: translation from English to kannada; first meeting of the expert panel to produce the first kannada version; pilot-testing in a focus group of adolescents; second meeting of the expert panel to produce a new consensus version; back-translation to English. The OIDP was translated from English to kannada by three kannada-speaking professional translators. Two of the three translators were unaware of the concepts used and of the objectives of the study. The validity of the translation was verified by experts in the use of questionnaire in both languages. All documents were translated from English to kannada and the validity was checked by back translation method. This was also checked after wording modifications, in order to ensure the conceptual and functional equivalences of the questionnaires. A pilot study was carried out on 10% of the total sample size from the different areas of Davanagere city, to validate all questionnaires before using them in the main data collection. It inferred the feasibility of the methodology with only minor modifications of the wording of the questionnaire. These subjects were not included in the main study.

The proforma consisted of total 22 questions with three subgroups. Sub group one was related to socio demographic characteristics. Sub group two and three were related to the OIDP inventory and oral health related behaviors and self assessed oral health status.

Prior to scheduling the survey, ethical clearance was obtained from the ethical committee of Bapuji Dental College and Hospital, Davangere. Informed consent was obtained from the parents as well as from the teachers before the distribution of the questionnaire. Prior to the distribution of the questionnaire purpose, aim and objectives were explained and discussed in detail with the study participants. The students were requested to fill the questionnaire with interest and concentration, so as to obtain valid results.

Oral Impacts on Daily Performances was obtained by adding scores for eight frequency items. "During the past six months how often have problems with your mouth and teeth caused you any difficulties with, 1) eating, 2) speaking and pronouncing clearly, 3) cleaning teeth, 4) sleeping and relaxing, 5) smiling without embarrassment, 6) maintaining emotional state, 7) enjoying contact with other people and 8) carrying out major school work. The scale used was in the range: (0) "never affected", (1) "less than once a month", (2) "once or twice a month", (3)"once or twice a week" (4) "3–4 times a week", (5) "every or nearly every day". For analysis, dummy variables were constructed yielding the categories 0 = "never affected" (including the original category 0) and 1 = "affected less than once a month or more often" (including the original categories 1–5). Simple count scores (SC) were created by adding the 8 dummy variables. Additive scores (ADD) were created by adding the 8 OIDP items as assessed originally. Finally the OIDP SC frequency scores were dichotomized, yielding the categories (0) "no daily performance affected" and (1) "at least one daily performance affected".

Satisfaction with dental appearance/oral condition was assessed by one item each - "Are you satisfied or dissatisfied with the appearance/condition of your teeth"?. A 3-point response scale was used ranging from (1) "very satisfied" to (3) "not satisfied".

Last dental appointment painful was assessed by one item - "If you have attended a dental clinic, was your last visit painful?" using the categories (0) Not painful and (1) Painful.

Clinical examination of the study subjects was done after obtaining and filling up the general information component of the survey proforma. The investigator underwent a calibration session for minimizing the intra-examiner variability and kappa value was found to be 0.78. Dental caries was examined by applying WHO modified criteria (1986) on DMF-Index by Henry T. Klien, Carrole E.Palmar and

Knutson J.W. (1938). Each tooth was wiped with cotton and dried prior to examination.

Data were analyzed using SPSS (Version 16.0). Cronbach's alpha and Cohen's kappa was used to test for, internal consistency reliability and intra-examiner agreement. To assess discriminate validity, multivariate analyses were performed by logistic regression and with the dichotomized OIDP SC scores as dependent variable, checking for all possible two-way interactions between independent variables. GLM ANOVA was conducted to assess construct validity after using log transformation (non-linear transformation) of the OIDP ADD scores. Age, gender, parental education were forced into multivariate analyses independent of statistical significance with the outcome variable to control for potential confounding effects.

RESULTS

Table 1 shows distribution of study subjects according age, gender, type of school, and socio-economic status. The study sample consisted of 900 subjects. Among them 100 (11.1%) were in 12 year age group, 327 (36.3%) were in 13 year age group, 203 (22.5%) in 14 year, 300 (33.3%) in 15 year respectively. Among 900 subjects 429 (47.7%) were male and 471 (52.3%) were female. Majority of subjects 673 (74.8%) were studying in private school and only few subjects 227 (25.2%) were studying in government school. Majority of subjects 301 (33.4%) belonged to class II followed by 285 (31.7%) in class IV, 203 (22.6%) in class III, 105 (11.7%) in class I and 6 (7%) in class V respectively. Out of the total 900 subjects only 205 (22.7%) had visited dental clinic for oral examination. Majority of the subjects 695 (77.2%) had not visited the dental clinic from the past one year.

Table 2 shows percentage distribution (percentages of students affected less the once a month or more) and mean frequency scores (SD) for the eight OIDP items and the OIDP ADD and OIDP SC scores. The mean OIDP ADD and OIDP SC scores were respectively, 9.1(S.D. 8.0, range 8-40) and 3.6 (S.D. 2.6, range 0-8). A total of 33.7% and 22.3% of the subjects said difficulties in eating and cleaning teeth respectively. The second most prevalent impact was difficulties with speaking (20.1%) followed by showing teeth and emotional status (17.6%). A total of 44% of the students experienced at least one impact during the 6 months preceding the survey.

Table 3 shows correlation matrix for OIDP frequency scores (1-8). The inter item correlation coefficients among the eight OIDP items ranged from 0.46 (between eating and emotional status) to 0.71 (between showing teeth and emo-

Table 1. Distribution of study subjects according age, gender, type of school, and socio-economic status dental attendance pattern

	Number of subjects	percentage
1. Age		
12	100	11.1
13	327	36.3
14	173	19.2
15	300	33.3
2. Gender		
Male	429	47.7
Female	471	52.3
3. Type of school		
Private	673	74.8
Government	227	25.2
4. Socio-economic status		
Class I	105	11.7
Class II	301	33.4
Class III	203	22.6
Class IV	285	31.7
Class V	6	0.6
5. Dental attendance		
Yes	205	22.8
No	695	77.2

Table 2. Percentage distribution (percentages of students affected less the once a month or more) and mean frequency scores (SD) for the eight OIDP items and the OIDP ADD and OIDP SC scores

OIDP items	Number of subjects n %	Mean scores (1-5) SD
1. Eating	303 (33.6)	1.7 (0.9)
2. Speaking	181 (20.1)	2.6 (1.2)
3. Cleaning teeth	201 (22.3)	2.5 (1.1)
4. Sleeping/relaxing	132 (14.6)	2.6 (1.1)
5. Showing teeth	159 (17.6)	2.5 (1.1)
6. Emotional status	159 (17.6)	2.5 (1.1)
7. Carrying out work	132 (14.6)	2.5 (1.1
8. Enjoy social contact	149 (16.5)	2.4 (1.1)
Total OIDP SC scores	396 (44)	3.6 (2.6)
Total OIDP ADD scores		9.1 (8.0)

Table 3. Correlation matrix for OIDP frequency scores (1-8)

OIDP items	1	2	3	4	5	6	7	8
Eating	1							
Speaking	0.55	1						
Cleaning teeth	0.57	0.67	1					
Sleeping/relaxing	0.49	0.57	0.58	1				
Showing teeth	0.54	0.63	0.66	0.63	1			
Emotional status	0.46	0.59	0.63	0.55	0.71	1		
Carrying out work	0.47	0.58	0.59	0.53	0.67	0.63	1	
Enjoy social contact	0.48	0.56	0.54	0.55	0.61	0.62	0.66	1

tional status). There were no negative correlation coefficients when the inter item correlation was done. No correlation was negative indicating homogeneity among the items. The cronbach's alpha of the scale was 0.81. The present alpha value falls within the recommended minimum of 0.70.

Table 4 shows discriminant validity: percentage distribution and odds ratio of single and overall OIDP SC frequency scores by clinical indicator. (OR adjusted for age, gender, Socio-economic status). Overall DMFT scores ranged from 0.0 to 10.0 with a mean of 2.1 (SD 2.3). A statistically significant differences were observed between students with

(DMFT > 0) and without decayed, missing and filled teeth (DMFT = 0) across the entire range of OIDP frequency items. Students with dental caries experience were 4.4 times (95% CI 2.9-6.7) and 3.3 times (95% CI 2.5-4.4) more likely to report respectively, difficulties with sleeping and relaxing and difficulties with eating than were their counterparts without decayed, filled and missing teeth.

Table 5 shows construct validity: mean values and 95% CI for OIDP SC and OIDP ADD scores by subjective oral health indicators (Adjusted for age, gender, and Socio- economic status). Statistically significant relationships were

Table 4. Discriminant validity: percentage distribution and odds ratio (OR) of single and overall OIDP SC frequency scores by clinical indicator. (OR adjusted for age, gender, Socio-economic status).

OIDP items		DMFT			OR 95% CI	P
		>0 (n=428)	0 (n=472)	T (n=900)		
1. Eating	Yes	202(47.2)	101(21.4)	303(33.7)	3.3 2.5-4.4	
	No	226	371	597		p<0.05
2. Speaking	Yes	126(29.4)	55(11.7)	181(20.1)	3.2 2.2-4.5	
	No	302	417	719		p<0.05
3. Cleaning teeth	Yes	128(29.9)	73(15.5)	181(20.1)	2.3 1.7-3.2	
	No	300	399	699		p<0.05
4. Sleeping/relaxing	Yes	101(23.6)	31(6.6)	132(14.7)	4.4 2.9-6.7	
	No	327	441	768		p<0.05
5. Showing teeth	Yes	111(25.9)	48(10.2)	159(17.7)	3.1 2.1-4.5	
	No	317	424	741		p<0.05
6. Emotional status	Yes	100(25.5)	50(10.6)	159(17.7)	2.9 2.0-4.2	
	No	319	422	741		p<0.05
7. Carrying out work	Yes	91(21.3)	41(8.7)	132(14.7)	2.8 1.9-4.0	
	No	337	431	768		p<0.05
8. Enjoy social contact	Yes	101(23.6)	48(10.2)	149(16.6)	2.7 1.9-4.0	
	No	327	424	751		p<0.05
OIDP scores >0	Yes	260(60.7)	136(28.8)	396(44)	2.9-5.1	
	No	168	336	504		p<0.05

Table 5. Construct validity: mean values and 95% CI for OIDP SC and OIDP ADD scores by subjective oral health indicators (Adjusted for age, gender, Socio-economic status)

Subjective oral health indicators	No. of subjects	OIDP SC scores Mean±SE 95% CI		OIDP ADD scores Mean±SE 95% CI		P value
Dental condition						
Good	430	1.3±0.1	1.1-1.5	2.6±0.2	2.6-3.8	
Average	388	1.4±0.1	1.1-1.6	3.3±0.32	2.7-4.0	P<0.001
Bad	82	4.1±0.3	3.4-4.7	10.7±1.0	8.7-12.7	
Dental satisfaction						
Very satisfied	271	1.3±0.1	1.1-1.5	3.0±0.3	2.4-3.5	
Satisfied	505	1.7±0.2	1.3-2.0	4.2±0.5	3.3-5.1	p<0.05
Not satisfied	124	2.5±0.2	2.0-2.9	5.5±0.6	4.4-6.6	
Dental appearance						
Good	383	1.4±2.3	1.2-1.6	3.0±0.3	2.5-3.5	
Average	451	1.5±0.1	1.3-1.8	3.7±0.4	3.0-4.3	P<0.001
Bad	66	3.2±0.4	2.5-3.9	8.1±1.1	6.0-10.3	
Last dental appointment						
Painful	544	2.2±0.2	2.0-2.5	5.2±0.4	4.4-5.9	P<0.001
Not painful	356	1.2±0.12	1.1-1.4	2.7±0.3	2.2-3.2	

observed between the OIDP and Subjective oral health indicators. Students being dissatisfied with oral condition, dental appearance and those who experienced last dental visit as painful, scored higher OIDP than did their in the opposite groups (P<0.001).

DISCUSSION

The main aim of this study was to rigorously adapt the OIDP index for Indian adolescents aged 12-15 years and successfully assess its psychometric properties in a sample drawn from Davanagere City. This study showed that the OIDP index has good reliability and validity among these subjects, thus indicating its applicability for adolescent population of similar age group in India.

As the OIDP index is aimed to be a brief and cost effective measure with high applicability in public health and needs assessment, it assesses oral impacts in relation to eight independent daily performances. The OIDP frequency scores showed item to scale correlations that are similar to those obtained in the previous applications[18] and the internal consistency reliability in terms of a Cronbach's alpha of 0.81% indicates excellent psychometric properties if the recommended level of 0.7% is used.[19] Previous applications of the OIDP scale to the various population have yielded internal consistency values ranging from 0.67 to 0.85.[20, 21, 18]

A total of 44% of the participants reported experiencing an oral impact that affected their daily life in the past six months. This eight impact prevalence rates ranged from 15% to 34%, consistent with the results reported in previous OIDP surveys[19-24] difficulty with eating and enjoying food and with cleaning teeth were the impacts most frequently reported. This is slightly lower than in other studies of similar ages[19, 22, 25] and slightly higher than the Tanzania and UK based studies. This could partly be explained by the different disease levels, age groups, culture and location of the sample.

The importance of oral health related quality of life is particularly relevant for the adolescents. Their perceptions are important as a number of their social and psychological coping skills are still developing. The results emphasize that perceptions of oral health and satisfaction with the mouth are strongly associated with oral health related quality of life; the better the perception, the lower the prevalence of oral impacts. An understanding of oral health related quality of life can only be achieved by asking participant about the impacts of dental conditions on their quality of life.

Hypothesis regarding the construct validity were confirmed in that the OIDP frequency scores varied positively with global measures of self rated oral health status, dental attendance and experience with dental pain. In the evaluation of the construct validity of the OIDP index, the score increased progressively, indicating worse oral health related quality of life, as the adolescent's self rated oral health status, dental attendance and dental pain, changed from healthy to unhealthy. This consistent pattern throughout the construct validity testing is an interesting and strong finding, because it highlights the close relationship between oral health related quality of life and other subjective measures of oral and general health. These differences were statistically significant for all the variables measured.

CONCLUSIONS

The present study has shown that a brief direct interviewer administered oral health related quality of life instrument is applicable for use among adolescents. Overall, the child OIDP showed good reliability and excellent validity. Thus the provision of dental care on children should address not just their clinical dental need, but give attention to their sociodental needs, taking also into consideration their perceptions in terms of the impact of the oral conditions on their daily life. Moreover, the present study indicates that the social and behavioral context is important in changing adolescent responses to oral disorders. This is particularly important in adolescents as their experiences in early life may influence their future attitudes and behaviors. Within these limits this study shows and suggests the incorporations of oral health related quality of life measures into the oral health care services for the younger generation.

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