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Psychometric properties of Hindi version of child oral impact on daily performances (C-OIDP) index amongst school children in North India

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ABSTRACT

Aim: To assess validity and reliability of Hindi version of Child Oral impact on daily performances (C-OIDP) index among school children in North India.

Material and methodology: Descriptive cross sectional study was conducted amongst 250, 11–12 year old school children in primary schools of Rishikesh, Uttarakhand, India. The study was done in two phases: first phase included assessment of Psychometric and linguistic properties of hindi version of C-OIDP index which was then pilot tested on study subjects. Phase two comprised of the actual main study which included the re-assessment of Hindi C-OIDP index on the entire study population. The pilot study comprised of 40 school children while the main study was conducted on 250 school children.

Results: The inter-item correlation coefficient ranged from 0.1 to 0.786 while corrected item total correlation coefficient ranged from 0.176 (smiling) to 0.843 ((cleaning). The standardised Cronbach's Alpha coefficient was 0.88. Moreover, the alpha coefficients didn't increase upon deleting any of the items. Weighted kappa was 0.85 & ICC was 0.9. Children with higher scores were less satisfied with their mouth (p- 0.001) in case of concurrent validity.

Conclusion: Hindi Child Oral Impact on Daily Performances index can be used as a valid and reliable instrument in measuring OHRQoL. of Paediatric North Indian population.

1. Introduction

Two eras in health has widely affected the mankind viz. one against Communicable diseases and another against chronic diseases. As these revolutions continue today we have entered into the third era of health with goals of longevity and viewing health as a resource to for everyday life.[1] Post declaration of the Ottawa Charter of WHO, Health has become an umbrella term that encompasses a state of complete physical, mental and social wellbeing.

Clinical indicators were falling short to tap this new dimension of health so researchers developed a new tool i.e Health Related Quality of Life measures that has gained momentum in the last two decades; and OHRQoL form its extension in the oral health care arena. However most of these measures are for the adult population.[2,3] With an increasing burden of oral diseases on the global economy and children forming a sizable part of the affected population OHRQoL for children were developed of which C-OIDP index (Child-Oral Impact on Daily Performance) is most commonly used. The C-OIDP focuses on measuring the most severe oral impacts, namely disability and handicap.[4,5] It helps in planning an optimum dental care regime for children based on oral disease burden in a given population. C-OIDP aids policymakers' world over in better planning & prioritizing oral health care for the tiny toddlers.[4] The Child Oral Impacts on Daily Performances index[1] was developed by Gherunpong among 11–12 year old Thai children.[6] With the advent of globalization, cross cultural adaptation of the C-OIDP index has led to its successful testing and translation into various different study populations to estimate the perceived oral health needs and oral health related quality of life among children.[6–11] Its use in different countries and age groups has been highly advocated.[12]

With respect to Indian scenario, oral diseases form a major burden of public health problem with children being the worst affected of all.[13] India has Hindi as its national language. However, in earlier studies, Indian researchers have used English version of C-OIDP or the translated instrument without validation to assess the oral impact on quality

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of life among various sets of the Indian population.[14] In order to validly use the instrument in India, it is important to investigate its psychometric properties.

Therefore, the present study was conducted with an aim to assess the psychometric properties and validate a Hindi version of the C-OIDP index in the Indian Paediatric population.

2. Methodology

The present cross sectional study was conducted in primary schools of Rishikesh, Uttarakhand, India. Prior approval was obtained from the institutional review board before starting the study.

Permission was also taken from the respective authorities of selected schools. Consent forms and letters informing parents were duly filled & obtained prior to the study.

Cross Cultural adaptation of the original English C-OIDP index by Gherunpong into its Hindi version is required for the development of hindi C-OIDP index. This was done in two phases: first phase included assessment of Psychometric and linguistic properties of hindi version of C-OIDP index which was then pilot tested on study subjects. Phase two comprised of the actual main study which included the re-assessment of Hindi C-OIDP index on the entire study population. Prior permission was obtained from the original author to conduct the validation process.

Linguistic validity involved the forward translation of the English C-OIDP index into Hindi followed by backward translation of the Hindi version into English. The forward translation was done by three independent translators who were proficient in English language and experts in quality of life measures. Then, the translated hindi version was analysed for content and wordings to maintain conceptual and item equivalence between the original index and its Hindi version. Following discussions among the three translators, the group finally agreed on a single drafted hindi translation of C-OIDP index. The drafted Hindi C-OIDP questionnaire was then back translated into English by an expert translator who was proficient in both English and Hindi language and who had not seen the original English version. A thorough discussion was held on the output of the back translated version and comparing it with the original C-OIDP index. The discrepancies between the back-translated version of Hindi C-OIDP index and the original version were compared and corrected, thus maintaining the conceptual equivalence. This was also forwarded to the author of original English version to look for any inconsistencies. After approval from the author of original index, the Hindi C-OIDP was used for the pilot study.

The pilot study was conducted on a random sample of 40 school children aged 11–12 years using final hindi C-OIDP questionnaire in a school not involved in the final study. The data was collected by the examiner and assisted by the classroom teacher. Following the test,a discussion was held with the school children to evaluate their grasping of the purpose of the entire exercise as well to understand how well the kids interpreted the content and wordings of the questionnaire. The comprehensiveness of the instrument was assessed by discussing the difficulties encountered in understanding various items in the questionnaire so as to optimize the face and content validity before the main study.

This was then followed by the main study in which the psychometric properties of the translated hindi C-OIDP index were assessed on a random sample of 250 schoolchildren aged 11–12 years from four schools in Rishikesh, India. The schools were randomly selected on the basis of those who gave permission to conduct the study. All the study participants were informed regarding the purpose of the study and written informed consent was obtained. The C-OIDP questionnaire was distributed in a class room to the children along with additional questions on perceived oral health status, satisfaction with oral health, perceived needs for dental treatment and tooth ache experience. The questionnaires were re-administered one week later on 50 of the 250 schoolchildren, representing 20% of the sample.

2.1. Scoring

The C-OIDP index measures oral impacts on eight daily performances i.e. eating, speaking, cleaning teeth, relaxing, emotional stability, smiling, doing schoolwork, and social contact. The frequency (0–3) and severity (0–3) were multiplied to get each impact score.[6] The impact scores of all eight performances were then summed up. Finally, the overall score was the sum divided by 72 (maximum possible score) and multiplied with 100 to give a percentage score. As a result, a child can have no oral impact (score = 0) or maximum oral impacts (score = 100) on his eight daily performances.[6]

2.2. Validity

Standardised Cronbach alpha coefficient, inter-item correlations and corrected item-total correlations were used to measure the internal reliability of the Child-OIDP. Test-retest reliability is the degree of agreement between two measurements taken at two different time intervals using the same scale and with the same participants, thus providing an estimation of the degree to which the results are reproducible.[12] The test-retest reliability was measured using weighted kappa for eight categories of the Child-OIDP scores and the intra-class correlation coefficient (ICC) using two-way random effects model.[15] The reliability tests were carried out to ensure the internal consistency of Child-OIDP index at different times.

Face and content validity were tested during the translation process by experts in dental public health and quality of life measures and during a pilot testing on school children. For criterion validity, the Hindi C-OIDP index was assessed for its ability to measure what it claims to measure. One of the objectives of the present study was to evaluate the effect of much neglected oral health needs of Indian children on their day to day activities and so, the criterion validity of the Hindi C-OIDP was tested by comparing its relationship with perceived need for dental treatment. Construct validity was tested by comparing its relationships with other measures such as perceived satisfaction with mouth, perceived oral health status and toothache experience in the previous 3 months.[16,17] The entire instrument was developed in accordance with the standard guidelines established for quality of life measures development.[18]

Data was statistically analysed using SPSS version 21.0. Descriptive and Inferential statistics were used to assess the relationship between C-OIDP and other subjecttive measures. The level for statistical significance was established at $p < 0.05$.

3. Results

The present study was conducted on 250 school children comprising of 54.4% males and 45.6% females. At least one oral impact was reported by 49.4% of participants which affected their daily performance in the past three months (Table 1). The most prevalent impact was difficulty eating (47.4%), followed by impacts on cleaning teeth (42%), speaking (36.8%), emotional stability (35.6%) and sleeping (29.2%).

Table 1
Prevalence of oral impacts on Daily Activities among study groups.

SEVERITY OF IMPACT	Quite a lot (3)	Pretty much (2)	Very little (1)	Total
Eating	5 (2%)	72 (17%)	86 (20.3%)	**153 (47.4%)**
Speaking	0	8 (3.2%)	79 (31.7%)	**92 (36.8%)**
Cleaning	0	26 (10.4%)	79 (31.7%)	**105 (42%)**
Sleeping	0	23 (9.2%)	50 (20.1%)	**73 (29.2%)**
Emotion	4 (1.6%)	19 (7.6%)	66 (26.5%)	**89 (35.6%)**
Smiling	3 (1.2%)	7 (2.8%)	27 (10.8%)	**37 (14.8%)**
Study	0	7 (2.8%)	22 (8.8%)	**29 (11.6%)**
Contact	0	7 (2.8%)	39 (15.7%)	**46 (18.4%)**

Table 2
Reliability analysis Inter-Item Correlation Matrix.

	Eating	Speaking	Cleaning	Sleeping	Emotion	Smiling	Study	Contact
Eating	1.000							
Speaking	.786	1.000						
Cleaning	.776	.760	1.000					
Sleeping	.687	.635	.625	1.000				
Emotion	.724	.755	.792	.686	1.000			
Smiling	.113	.146	.166	.159	.141	1.000		
Study	.665	.688	.742	.583	.690	.100	1.000	
Contact	.325	.385	.379	.374	.364	.243	.424	1.000

Table 3
Reliability analysis: Corrected item-scale correlations and Cronbach's alpha values if item deleted.

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Eating	.820	.875
Speaking	.826	.875
Cleaning	.843	.873
Sleeping	.728	.888
Emotion	.830	.874
Smiling	.176	.919
Study	.762	.881
Contact	.445	.907
Cronbach's alpha		.901
standardised		.888

Schoolwork and smiling were the least prevalent impacts, occurring in 11.6% and 14.8% of school children. To assess internal reliability, the inter-item correlation coefficients among the eight items of C-OIDP ranged from 0.100, which depicted the relationship between study or doing schoolwork and smiling, to 0.786 which represented the relationship between eating and speaking (Table 2). All the inter-item correlations in the present study were positive. The corrected item-total correlation coefficients ranged from 0.176 (smiling) to 0.843, which related to cleaning (Table 3). The standardised Cronbach's alpha coefficient was 0.88, indicating good internal consistency. Also, the alpha coefficient did not increase when any of the items were deleted.

The test-retest reliability was assessed using the weighted kappa statistic which was 0.85 and the ICC was 0.90.

To assess concurrent validity (Table 4), those with a higher C-OIDP score were less likely to be satisfied with their mouth ($p = 0.001$). Similarly, those who perceived their oral health as fair or poor were more likely to have a higher C-OIDP when compared to those who perceived their oral health as"good", “very good” or “excellent” ($p = 0.01$).Furthermore, children who perceived a need for dental treatment had much higher C-OIDP scores than those who did not had perceived need ($p = 0.001$). Among self-perceived oral health problems, sensitive tooth (44.4%), toothache (38.46%), bleeding gums (35.1%) were the major oral health issues while fractured or missing permanent teeth or loss of space due to unerupted tooth were not reported at all (Table 5).

Table 4
Concurrent validity tests for the Child-OIDP: comparison of Child-OIDP scores between different categories of related outcome variables.

Categories	Variables	N	C-OIDP Quartiles	p-value
Perceived oral health	Fair or Poor	100	(0,1.8,5.9)	0.01
	Good, Very good or excellent	150	(0,0,2.1)	
Perceived Satisfaction with mouth	Dissatisfied	33	(0,5.5,10.01)	0.001
	Neither	69	(0,0,4.10)	
	Satisfied	148	(0,0,2.28)	
Perceived Dental Treatment need	Not present	179	(0,0,1.9)	0.001
	Present	71	(0,1.3,8.3)	

Table 5
Prevalence of Self perceived oral health problems among the study groups.

Self perceived oral health problems	Percentage of school chilren
Toothache	38.46
Sensitive tooth	44.44
Tooth decay, hole in tooth	11.8
Exfoliating primary tooth	1.8
Tooth space (due to non erupted permanent tooth)	0
Fractured permanent tooth	0
Color of tooth	11.9
Shape or size of tooth	2.56
Position of tooth	28.2
Bleeding gums	35.1
Swollen gum	20.4
Calculus	24.5
Oral ulcer	5.23
Bad breath	5.12
Deformity of mouth or face	4.1
Erupting permanent tooth	3.41
Missing permanent tooth	0

4. Discussion

The present study aimed at the linguistic and cross cultural adaptation of the C-OIDP index in Indian paediatric population and its validation. A suitable instrument to measure the OHRQoL in the Indian paediatric population was needed since a very long time. Since, the English version of C-OIDP index would not have been locally effective to administer; hence, a translation and validation of the existing C-OIDP was carried out into Hindi language.

The present study showed that the hindi version of C-OIDP index has good reliability and excellent validity among a culturally diverse population of 11–12 year-old school children in Rishikesh, India. Thus, the index can be widely used for child populations of similar ages in India. Intercultural process of adaptation of C-OIDP from English into Hindi language was simple and the comparison of the original C-OIDP index and the translated English version did not create differences in meaning or context.

The development of hindi C-OIDP index was in conformation with standard protocols and guidelines as established and followed by previous related studies.[18] For any instrument to be effective, its reliability should be high which is generally measured in terms of Cronbach's alpha. We obtained a high Cronbach's alpha value of 0.88, indicating good internal consistency. According to Nunnally and Bernstein,[19] the standard criteria for reliability should have a minimum value of Cronbach's alpha as 0.7. Furthermore, the alpha coefficient did not increase when any of the eight items were deleted from the instrument. This signifies good consistency of the questions in the instrument.

The weighted kappa and the ICC were 0.85 and 0.90 respectively which made this version of C-OIDP reliable in terms of test-retest reliability. The rectified item-total correlations were above 0.2 except for the parameter of smiling.[12] The inter-item correlations were positive for all the items and well within limits making them valid and useful parameters.

Health is a multifaceted experience dependent on various genetic and epigenetic factors. Any questionnaire that has to be used in a population must be well adapted to the language and cultural context of that population.[12] So the Hindi version of C-OIDP was checked for its face and content validity in the pilot study. The concurrent validity was also tested for the hindi version and the results clearly pointed out that Oral health related quality of life intertwines closely with the way an individual perceives his oral health and treatment needs, the more aware and conscious an individual is regarding his/her oral health the lower the prevalence of the oral diseases.

Overall, 49.4%of children reported an oral impact on their daily performance which is slightly higher than in other studies of similar ages.[6,8,20] This could partly be attributed to the different disease levels, age groups and cultural patterns of the study population. The most prevalent impact was 'eating' which was similar to other studies done using C-OIDP.[6,8,20]

Oral health-related quality of life is of special concern with regard to children since they pass through several stages where social and psychological coping skills are in different phases of development making them more sensitive to a variety of impacts, such as appearance etc. These impacts eventually affect their quality of life and psychological development thus, influencing their social behavior.[21–23]

Children are often not considered to be reliable in answering questionnaires and a number of studies have relied on using proxy measures.[24] However, because children and parents or caretakers may not share same views regarding illness, hence it has always been advocated that the impact of illness and health on their daily lives should be asked from children itself.[25] Another important consideration is the method of administration of quality of life measures. Self-administered questionnaires are cost effective but they may be more suitable for older children. Face to face interviews are a viable option for checking any questionnaire in younger children.[12] It has its pros and cons like its more reliable and children are more receptive to our questions but it's a costly affair. For this purpose our Hindi version of C-OIDP questionnaire tries to strike a balance by being comprehensive and yet practical.

5. Conclusion

The translated Hindi version of the C-OIDP index in Paediatric North Indian population is a valid and reliable instrument to measure the OHRQoL. Overall, the Child-OIDP index showed excellent reliability and validity. This scale could be of great significance as it will help in addressing not only the clinical needs but also the socio-dental needs of children. This is important since the experiences in early life of children may influence their future attitudes and behaviors.

Clinical significance

1. C-OIDP questionnaire is a very important patient centric tool that helps the clinician to better understand the patient demands and requirements and use the information to devise a comprehensive treatment plan for every patient.
2. C-OIDP highlights the effect of oral health on patients' day to day activities and so it can also be used as a very precise tool to evaluate the clinical outcomes of the dental treatment provided to the patient over a period of time.
3. C-OIDP also helps to evaluate the effect of the preventive measures taken at both levels i.e. professional level viz. topical fluoride application or pit and fissure sealants etc. as well as those performed by the patient at home like oral hygiene maintenance regime and modify the same to for every patient.
4. C-OIDP questionnaire also is a very good tool to motivate the patient to maintain a good oral hygiene regime and visit the dentist at regular intervals.

Conflicts of interest

The authors have none to declare.

Ethical approval

Ethical approval was received from Institutional Ethical Committee.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jobcr.2018.08.001.

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