

Validity and Reliability of the Indonesian Version of Oral Hygiene Behavior Index Questionnaire: A Cross Sectional Study among Young Adolescents in Junior High School in Bandung, Indonesia

Netty Suryanti¹, Armasastra Bahar^{2*}, Anton Rahardjo², Ali Nina Liche Seniati³, Diah Ayu Maharani²

1. Department of Preventive and Public Health Dentistry, Faculty of Dentistry, Universitas Indonesia, Jakarta 10430, Indonesia.
2. Faculty of Psychology, Universitas Indonesia, Depok 16424, Indonesia.

Abstract

Measuring oral health should not be confined exclusively to the use of clinically normative indicators, but oral hygiene behavior is also the one indicator of oral health. The Oral Hygiene Behavior (OHB) index can be used to measure oral self-care behavior and have been used and validated in Western populations. To use a scale in a different groups of young adolescents in Indonesian, it is necessary to re-establish its psychometric properties. This study was conducted to estimate the psychometric reliability and validity after adapting the OHB index to the Indonesian language.

The OHB index questionnaire was translated to Indonesian, and then given to 251 young adolescents aged 13-15 years from junior high school in Bandung, Indonesia. The psychometric properties of the Indonesian version of OHB Index were evaluated to test the reliability and validity. The study focused on validating the Indonesian version of the OHB Index, with clinical determinants (dental plaque score). Clinical examination of dental plaque was assessed by O'Leary Plaque Index.

Six of eight items from the Indonesian version of OHB Index was significantly associated with plaque score as a validity criterion. The reliability coefficient shows inadequate internal consistency (Cronbach's alpha: 0.65), in other hand test-retest reliability shows a good reliability. (ICC: 0.79)

This study showed that the Indonesian version of OHB Index is reliable in term of time stability and also valid in term of criterion validity.

Clinical article (J Int Dent Med Res 2019; 12(2): 633-639)

Keywords: OHB Index, Young adolescent, Indonesia, Validity, Reliability.

Received date: 10 February 2019

Accept date: 23 March 2019

Introduction

The oral health of adolescents in Indonesia is a severe problem, especially regarding dental caries and gingivitis. According to the World Health Organization (WHO), the proportions of adolescents aged 12 and 15 years with oral health problems are as high as 24% and 23.1%, respectively.¹ The prevalence of caries found in 13-15-year-old junior adolescent in Bandung and its satellites cities is 90%.² Bandung has a heterogeneous population, hailing from numerous ethnicities, and socioeconomic strata.³ Measurements of oral

health are important for evaluating oral health programs. The state of oral health can offer many clues about overall health and general well-being. The state of oral health may be defined as a standard of health of oral and related tissues that enables individuals to eat, speak, and socialize without active disease, discomfort, or embarrassment.⁴ The primary concern of oral health educators is to impart positive oral health knowledge and behavior in society, with the ultimate goal of sustained positive behaviors. Oral health knowledge is considered to be crucial for developing healthy behaviors, and it has been shown that there is an association between increased knowledge and better oral health.⁵

Oral hygiene is the most effective measure to prevent dental caries and periodontal disease.⁶ Oral hygiene behavior is one indicator of dental and oral health status. Caries and periodontal disease are the main problems of unclean teeth and mouth from plaque. Practice

*Corresponding author:

Armasastra Bahar
Department of Preventive and Public Health Dentistry
Faculty of Dentistry, Universitas Indonesia
Jakarta 10430, Indonesia
E-mail: armsbah@hotmail.com

Oral self-care, can be considered an important aspect of oral hygiene behavior.⁷ Brushing teeth is one of the most effective ways to reduce plaque, so dental caries can be prevented by brushing regularly, with toothpaste containing flour.⁸

One of the young adolescent oral health problems can be caused by a lack of dental health knowledge, and the lack of information about dental health care.⁹ Lack of knowledge, and public awareness can be caused because the implementation of promotion programs to prevent dental and oral health is not optimal.¹⁰ Therefore it is necessary to provide oral health promotion for appropriate prevention according to adolescent needs. The WHO calls for a reorientation of oral health systems towards prevention and health promotion. The Oral Health Program of the WHO emphasizes the application of evidence-based strategies in the promotion of good oral health and the prevention and treatment of oral health diseases.⁹ The development of programs for oral health promotion one of which is important is the identification of health determinants.¹¹ Based on this concept, measuring oral health should not be confined exclusively to the use of clinically normative indicators.

The purpose of identifying the determinants of oral health is to prevent by improving or changing low dental health behavior. During this time clinical examinations were more reliable. To design the right oral health promotion program, it is very important to identify oral hygiene behavior and other related behaviors. There is a method of checking oral hygiene behavior using a questionnaire. Available methods of measuring oral health behavior have been used and validated in Western populations, namely an index for oral hygiene behavior (OHB index).⁷

The OHB index is a useful method for assessing and evaluating oral hygiene self-care practices of individuals. The OHB index included all brushing details and other potential components of personal oral hygiene regimens, such as the use of tooth sticks, interdental brushes, toothpaste with fluoride, and tongue cleaning. The OHB index was given the relatively low number of items and the substantial variety in the content of the items; the index had a sufficient internal structure, as was apparent from its face validity.⁷

Oral hygiene behavior may be influenced by environmental and cultural factors, thus affecting the psychological determination of oral hygiene behavior.¹² The importance of identifying tooth brushing behavior and other oral hygiene behavior to design oral health programs according to the needs of young adolescent in Indonesia, it must be adapted to Indonesian to ensure a better understanding. The outcomes of oral behavior studies can be used to increase awareness in the target population and hence the needs perceived by the patients and to plan oral health-promotion programs. The purpose of this study was to translate the original English version of the OHB index into Indonesian and to assess its reliability and validity.

Materials and methods

The translation original OHB index English version was assessed and revised by an expert panel regarding the concept of item equivalence between the original and Indonesian versions. The original English version of the OHB index was obtained from a previous publication and translated by a bilingual professional according to the guidelines for the cross-cultural adaptation process.¹³

The Indonesian version of OHB index was pilot tested to 30 students aged between 13-15 years old to determine its sensitivity to Indonesian culture and the use of proper wording. For the transcultural adaptation, face-to-face interviews of children were conducted by one interviewer because of the lack of reading capability. The Indonesian version was then translated back into English by an Indonesian dentist who was masked from the original wording of the OHB index. Finally, the OHB index was confirmed by the expert panel after minor revisions.

This was a cross-sectional study that used questionnaires administered involving 251 students aged 13-15 from the population young adolescent for this study included student in junior high school in Bandung, a city in the capital of West Java Province.³ Two schools were randomly selected from the lists of junior high schools in west and east Bandung City, which was obtained from the Education Office of Bandung.

The study was approved by the Ethics Committee of the Faculty of Dentistry,

Universitas Indonesia. The OHB index is a measure of the extent to which people engage in optimal oral care, as defined by professional standards. OHB index included eight items with respect to tooth brushing, interdental and tongue cleaning. There are various response scale in OHB index. For example, the item 'I brush my teeth as follows' was supported by pictures showing different brushing methods, and other items using diverse scales. The OHB sum score of this index was in the range 0 -16. A higher sum score indicated a higher level oral self-care.⁷ Sample size estimation was conducted using the G*Power to analyze required sample size to test the hypothesis of convergent validity of the questionnaire, with estimated correlation based on published study by Buunk-Werkhoven of a 0.46 Pearson correlation, power of 95%, and alpha of 5%.⁷ A total of minimum 233 individuals fulfilling the inclusion criteria were recruited, adding 10% of the total sample size needed. The first questionnaire was given to students to request parental consent, and students' assent to participate, after being approved then an OHB index questionnaire was examined and dental plaque examination.

Clinical examination of dental plaque was assessed at each session by means of a liquid plaque disclosing agent using the O'Leary plaque index.¹⁴ It is able to identify dental plaque on four tooth surfaces, in accordance with the objectives of the OHB index is a useful method for assessing and evaluating oral hygiene self-care practices of individuals. In order to ensure intra-examiner consistency, a randomly selected ten subjects were examined for plaque index and were re-examined. Using Kappa statistics, intra examiner reliability was 0.87 for plaque index. Reliability was tested using Cronbach's alpha and Intra-class Correlation Coefficient (ICC). The concurrent validity was tested through associations between the Indonesian version of OHB index scores and the plaque score (total tooth surface with plaque) using Spearman's correlation coefficients.

Results

Total participants from two schools are 251 students (48% were male and 52% were female). The internal consistency reliability with Cronbach's alpha coefficients was 0.65; while test-retest reliability that is measured at 50

students who were re-interviewed one week after the first visit and intra-class correlation coefficient was 0.79.

Table 1 shows the percentage of every item in the OHB index questionnaire. Most of the of participants (85%) brushed their teeth twice a day as recommended and brushed their teeth before breakfast and before going to sleep at night (55%). The number of participants who brush their teeth softly (21%) and forcefully or forcefully and softly are relatively the same. Most of the participants (45%) brushed their teeth for 1 minute or more than 3 minutes and participants who brush their teeth 2 to 3 minutes are 41.%. The number of participants who brush their teeth using horizontal movement is 68% and with the bass method were few (2.4%). There is only small number of participants using the fluoridated toothpaste (13%). About 60% of the participants never do interdental cleaning and tongue cleaning. All of statistics test showed that there is a significant difference in every kind of oral health behavior.

The measurement result of the plaque score index by O'Leary showed a minimum of plaque surface that is 12 and a maximum 112, an average of 89.80. The results of the score plaque calculation had not score 10% or less. The analysis showed that the OHB index is able to discriminate between plaque score. Only one question (the use of fluoride in toothpaste) was unable to differentiate between high and low plaque scores (Table 1).

Table 2 shows the overall mean OHB Index score was 7.57 ± 2.45 (mean \pm SD; range: 3–13), with correlation coefficient of -0.71 . The validity of the Indonesia OHB Index is tested using the total tooth surface with plaque as a criterion. The result showed that there is a significant correlation between total score of OHB Index with the plaque. From 8 items of OHB Index, 6 items also had significance correlation with plaque. It means the Indonesian OHB Index is valid to diagnosis the oral health behavior that indicated by the total tooth surface with plaque.

Discussion

Oral hygiene daily behavior is important for the young adolescent at the age of 13 to 15 years old. According to WHO in the age of 13 permanent teeth from incisors to the first molar have grown, and in the age of 15 all teeth have

grown completely. As caries is irreversible and there is no treatment given, the teeth condition will become worse and need be extracted. It can also result in a loss of learning concentration, so the student will not do well on learning.¹⁵ Oral Health behaviors that are prevalent in childhood, will be carried over into adulthood.¹⁶

Oral hygiene behavior is not simply a matter of daily removal of dental plaque by 'just tooth brushing and a flossing. Flossing is often neglected and tooth brushing is often not done in the way it should be done.⁷ The OHB Index is a useful method for assessing and evaluating oral hygiene self-care practices of individuals. The OHB index includes all brushing details and other potential components of personal oral hygiene regimens, such as the use of tooth sticks, interdental brushes, toothpaste with fluoride, and tongue cleaning.⁹ In this study, oral health status was also assessed by using the Plaque Indexes, and their results were correlated with those of the OHB index.

This study is a cross-cultural adaption of the OHB index in Indonesia, which used test reliability and validity analysis. Further, a pretest phase was employed for identifying potential problems with the questionnaire content, such as misunderstanding the intended meaning of items and their clarity. This research used internal consistency and test-retest to test the reliability, and used tooth surface plaque as criterion to test the validity of the Indonesia OHB index. The Indonesian version of the OHB index shows inadequate internal consistency, but had a good test-retest reliability. The Indonesian version of OHB Index is not reliable in term of internal consistency, which means the items are not homogenous. One of them in this measurement there are variations in the items of questions.¹⁷ However the questionnaire is reliable in term of time stability, which means the score of the participants, is relatively consistent if they fill the questionnaire in different time.

The criterion validity was tested through associations between the Indonesian version of OHB Index item scores and the plaque scores (total tooth surface with plaque). The OHB Index Indonesian version was significantly associated with plaque score on six items and two items were not significant (frequency of tooth brushing and the use of fluoride in toothpaste). The Indonesian version of OHB index as a whole is able to discriminate between plaque score, but

only one item question (the use of fluoride in toothpaste) was unable to differentiate between higher and lower plaque scores. It means the Indonesian OHB index is valid to diagnosis the oral health behavior that indicated by the total tooth surface with plaque. This result is different from research from Buunk-Werkhoven and Geetha S.^{7,4} The OHB index in the population may be different, this is according to what Buunk-Werkhoven suggested that this culturally adapted version of the OHB index corresponds closely to the actual oral hygiene behavior of the participants.⁷

Based on the American Dental Associations, ADA.¹⁸ recommendations, the frequency of brushing teeth twice a day has been carried out by almost all students and in accordance with the results of research by Buunk-werkhoven YAB et.al.⁷ but not significantly related to the amount of surface containing high plaque. Students may have been exposed to information about the frequency of brushing twice a day, because at the time of primary school dental health promotion was given, but they don't brush their teeth at the right time, which is minimal after breakfast and before going to sleep. The majority of students brush their teeth morning before breakfast. This is in accordance with the research of Rahardjo A et al (2015) that majority of the study population in Indonesia performs tooth brushing only early in the morning.¹⁹ They also have the habit of brushing their teeth in the morning when bathing (morning before breakfast). That people regularly brush their teeth every day, but tooth decay due to caries is still high, this can be caused by several factors including not brushing your teeth at the right time.²⁰ Finding confirms data reported in the literature showing that oral hygiene habits are associated with dental caries experience in adolescents.²¹

For questionnaire items using fluoride toothpaste, most respondents did not know whether or not the toothpaste used contained fluoride, did not understand the benefits of fluoride in toothpaste, and also never pay attention to the content in the toothpaste. As suggested by Maharani et.al, dental caries among Indonesian children is one of them because it is inappropriate in brushing teeth with fluoride toothpaste.²² This shows that knowledge of the importance of containing toothpaste is still low.

Majority of students brushed their teeth for two to three minutes with soft/forceful pressure. This is in accordance with the study done by Buunk-werkhoven YAB et al,^{7,12} Geetha S. et al.⁴ The horizontal or combination method is more used to clean teeth and majority respondents never cleaned their tongues every day. This is because many respondents do not know that the tongue must be cleaned and its benefits.

Most students did not use interdental cleaning, although some students claimed to use tooth sticks but students used them only once and if needed if there was food involved. Some students know about dental floss but have never used it and all students don't know about dental brushing. This interdental cleaning usage does not accordance with the study done by Buunk-werkhoven YAB et al,⁷ and Geetha S. et al.⁴

Overall mean OHB index score was low level of self-care OHB and the plaque score calculation is not good evaluation of the oral hygiene, because all students have a score plaque above 10% (have a lot of plaque on the surface of the tooth). The results of the measurement of plaque scores are in line with the results of the OHB index assessment. Validity test results showed a strong negative correlation, which was indicated by a low sum scores of OHB index and clinical examination results showed a high plaque score.

While the results of this study have some limitations that need to be addressed in future studies. There may be a bias for social desirability when the method of filling out the questionnaire itself. They often get information on brushing twice a day from oral health education programs in elementary schools. Therefore, they want to provide information that is deliberately adapted to what is seen as good by most of their friends, even if it is not what they do.²³ For further research, interview method can be used. The use of interdental cleansers in Indonesia is not yet familiar, because it is still less promoted.

Our findings indicate that to improve oral hygiene self-care behavior, it should be considered for each OHB item, by measuring the extent to which knowledge is related to each OHB item and knowing the relationship. So that it can clearly detect its determinant factors. Therefore, this OHB index can be used to assess young adolescent oral hygiene behavior and can be modified according to needs.

Conclusions

The Indonesian version of OHB index is reliable and valid used to measure oral self-care behavior for 13 to 15 years' Indonesian young adolescent. Future studies should extend to a wider sample, region, and social level so that it can be a multicultural Indonesian representation.

Acknowledgements

The publication of this manuscript is supported by Universitas Indonesia

Declaration of Interest

The authors report no conflict of interest and the article is not funded or supported by any research grant.

References

1. Kwan SY, Petersen PE, Pine CM, Borutta A. Health-Promoting Schools: An Opportunity for Oral Health Promotion. *Bull World Health Organ* 2005;83(9):677-85.
2. Public Health Service Republic of Indonesia. *Basic Health Research* 2013:111-6.
3. Bandung City Health Office. *Bandung Health Profile*. 2012. Available at: http://www.depkes.go.id/resources/download/profil/PROFIL_KA_B_KOTA_2012/3273_Jabar_Kota_Bandung_2012.pdf 2012.
4. Geetha S, Pramila M, Kittu J. Validity of Oral Hygiene Behavior Index Kannada Version Among Young Adolescents in Bangalore, India- A Cross Sectional Study. *Int J Health Sci Res* 2016; 6(2):213-7
5. Blaggana A, Grover V, Anjali, et al. Oral Health Knowledge, Attitudes and Practice Behaviour among Secondary School Children in Chandigarh. *J Clin Diagn Res* 2016;10(10):ZC01-6.
6. Choo A, Delac DM, Messer LB. Oral Hygiene Measures and Promotion: Review and Considerations. *Aust Dent J* 2001;46(3):166-73.
7. Buunk-Werkhoven YA, Dijkstra A, van der Schans CP. Determinants of Oral Hygiene Behavior: A Study Based on the Theory of Planned Behavior. *Community Dent Oral Epidemiol* 2011;39(2): 250-9.
8. Vehkalahti MM, Widstrom E. Teaching Received in Caries Prevention and Perceived Need for Best Practice Guidelines Among Recent Graduates in Finland. *Eur J Dent Educ* 2004;8(1):7-11.
9. World Health Organization. The objectives of the WHO Global Oral Health Programme (ORH). Available at: http://www.who.int/oral_health/objectives/en/
10. Ministry of Health Republic of Indonesia. Directorate General of Health Efforts. *Guidelines for Dental Health School effort in Middle and High School*; 2012. Available at: perpustakaan.depkes.go.id:8180/bitstream/.../2/BK2012-396.pdf.
11. Health promotion and oral health Available at: http://www.who.int/oral_health/strategies/hp/en/
12. Buunk-Werkhoven YA, Dijkstra A, Bink P, van Zanten S, van der Schans CP. Determinants and Promotion of Oral Hygiene Behavior in the Caribbean and Nepal. *Int Dent J* 2011;61(5):267-73.

13. Van Widenfelt BM, Treffers PD, de Beurs E, Siebelink BM, Koudijs E. Translation and Cross - Cultural Adaptation of Assessment Instruments Used in Psychological Research with Children and Families. *Clin Child Fam Psychol Rev* 2005;8(2):135-47.
14. Montecvecchi M, Moreschi A, Gatto MR, Checchi L, Checchi V. Evaluation of Clinical Effectiveness and Subjective Satisfaction of A New Toothbrush For Postsurgical Hygiene Care: A Randomized Split-Mouth Double-Blind Clinical Trial. *Scientific World Journal* 2015; 2015:828794.
15. Petersen PE. The World Oral Health Report 2003: Continuous Improvement of Oral Health in the 21st century--The Approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2003;31(Suppl 1):3-23.
16. Åstrøm AN. Stability of Oral Health-Related Behaviour in A Norwegian Cohort Between the Ages of 15 And 23 Years. *Community Dent Oral Epidemiol* 2004;32(5):354- 62.
17. Tavakol M, Dennick R. Making Sense of Cronbach's Alpha. *Int J Med Educ* 2011; 2:53-5.
18. ADA. Cleaning your teeth and gums (oral hygiene). Available at: <http://www.ada.org/3072.aspx?current Tab=1#faq> [last accessed 2010].
19. Rahardjo A, Maharani DA, Kiswanjaya B, Idrus E, Nicholson J, Cunningham PJ, et al. Measurement of Tooth Brushing Frequency, Time of Day and Duration of Adults and Children in Jakarta, Indonesia. *Journal of Dentistry Indonesia* 2015; 21:85-8.
20. Ministry of Health Republic of Indonesia. Data and Information Center. Oral Health Situation. Jakarta. 2014
21. Freddo SL, Aerts DR, Abegg C, Davoglio R, Vieira RC, Monteiro L. Oral Hygiene Habits and Use of Dental Services Among Teenage Students in A City in Southern Brazil (In Portuguese) *Cad Saude Publica* 2008; 24(9):1991–2000.
22. Maharani DA, Adiatman M, Rahardjo A, Burnside G, Pine C. An Assessment of The Impacts of Child Oral Health in Indonesia and Associations with Self-Esteem, School Performance and Perceived Employability. *BMC Oral Health* 2017;17(1):65
23. Conger JJ. Adolescence and Youth: Psychological Development in a Changing World, 4th Edition, Harper Collins Publishers, Inc., 10 East 53rd Street, New York, New York, 10022-5299, 1991.

Item	Percent	Total tooth surface with plaque	
		med (min-max)	P-value
Total Score OHB Index (0 -16)		93.00 (12-112)	0.000 ^a
Frequency of tooth brushing			
Not every day	2.4	107.50 (100-112)	
Once a day	12.4	89.00 (53-110)	0.014 ^a
Twice a day or more than twice a day	85.3	92.50 (12-112)	
Moments of tooth brushing			
Once a day: Before going to sleep	31.5	104.00 (50-112)	
Twice a day:			
After dinner in evening and other moment or all combinations			
Morning before breakfast or noon and before going to sleep	55.0	89.50 (15-112)	0.000 ^a
Morning before or after breakfast and noon			
Morning after breakfast and before going to sleep			
Three times or more a day , including: after dinner in evening and Before going to sleep	8.0	85.50 (12-110)	
	5.6	78.50 (62-104)	
Measure of force of tooth brushing		104.00 (50-112)	
Forcefully (6, 7)	39.4	91.00 (12-112)	0.000 ^a
Forcefully/Softly (4, 5)	39.4	80.00 (15-111)	
Softly (1, 2, 3)	21.1		
Duration of tooth brushing		104.00 (69-111)	
Shorter than 1 minute	13.1	98.00 (43-112)	0.000 ^a
Longer than 3 or 1 minute	45.0	87.00 (12-112)	
2 min or 3 min	41.8		
Method of tooth brushing		104.00 (12-112)	
Vertical movement or Circular movement	29.5	89.00 (15-112)	0.000 ^a
Horizontal movement or combination of methods	68.1	63.50 (33-90)	
Bass-method	2.4		
Fluoride toothpaste			
Toothpaste without fluoride or other alternatives	86.9	94.00 (12-112)	0.056 ^b
Toothpaste with fluoride	13.1	88.00 (44-112)	
Interdental cleaning			
Never interdental cleaning	59.8	101.00 (43-112)	0.000 ^a
Sometimes interdental cleaning	39.8	86.00 (12-112)	
At least once a day floss and/or tooth sticks and/or interdental brushes.	0.4		
Tongue cleaning			
Never	56.2	101.00 (12-112)	0.000 ^a
Sometimes	38.2	87.00 (15-110)	
Every day	5.6	82.00 (44-104)	

Table 1. Discriminant validity of the OHB Index by total tooth surface with plaque.

Item OHB	Mean	Standard Deviation	Correlation between OHB Index item scores and total tooth surface with plaque	
			<i>r</i> *	<i>P</i> -value
Frequency of tooth brushing (0 – 2)	1.83	0.44	- 0.021	0.737
Moments of tooth brushing (1 – 4)	1.88	0.78	- 0.458	0.000
Force of tooth brushing (0 – 2)	0.82	0.76	- 0.516	0.000
Duration of tooth brushing (0 – 2)	1.29	0.66	- 0.361	0.000
Method of tooth brushing (0 – 2)	0.73	0.49	- 0.481	0.000
Fluoride toothpaste (0 – 1)	0.13	0.34	- 0.121	0.056
Interdental cleaning (0 – 2)	0.41	0.50	- 0.421	0.000
Tongue cleaning (0 – 2)	0.49	0.60	- 0.431	0.000
Total OHB Index (0 –16)	7.57	2.45	- 0.71	0.000
Range		3 -13		

Table 2. Criterion validity of the OHB Index item scores by total tooth surface with plaque. *r** = Spearman’s correlation coefficient