

Trans Cultural Adaptation and Validation Indonesia Version of Early Childhood Oral Health Impact Scale (I-ECOHIS)

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Abstract

The Early Childhood Oral Health Impact Scale (ECOHIS) is an assessment of the impact of oral health problems of preschoolers on the quality of oral health assessed by parents. The purpose of this study was to develop ECOHIS in the Indonesian version and evaluate the validity and reliability of ECOHIS among preschoolers. The Indonesian version of ECOHIS (I-ECOHIS) was developed through the Trans-cultural adaptation of psychometric analysis. The study was conducted to assess internal consistency, convergence validity, construct validity, and discriminant validity. Data were collected from 117 parents of children aged 3-5 years from six play-group schools in the Meuraxa sub-district of Banda Aceh city. Cronbach's alpha for the I-ECOHIS instrument is 0.874. On convergent validity and construct by using spearman analysis, the correlation value of the I-ECOHIS coefficient as a whole r 0.645 and 0.654 and $P \leq 0,01$. Discriminant validity, using Kruskal Wallis crucial $p \leq 0.05$. I-ECOHIS is a valid measure and can be used to assess the quality of life of children aged 3–5 years in Indonesian children.

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Introduction

The prevalence of preschool caries varies considerably across countries, ranging from 17% to 94%.¹ Prevalence of 5-year-old caries in China in 2011 was 64% with mean dmft 2.96.² The prevalence of caries found in 5 year-old children in Jakarta and its satellites cities is 90%, and the decay score is 6.8 teeth.³ In young children, assessing oral impacts on daily performances is important because poor oral health can affect not only their future dentition, but also their growth, weight, social life, self-esteem, and school performance.^{4,5}

Measures to capture the Child Oral Health Related Quality of Life (COHQoL) among younger preschool children have been developed. There are several oral health related quality of life (OHRQoL) questionnaires for children, which

are available for the various age range.⁵ For children under 5 years of age, instruments such as the following have been developed: Michigan COHRQoL Scale,⁶ Early childhood Oral Health Impact Scale (ECOHIS),⁷ and Scale of Oral Health Outcomes for 5-year-old children (SOHO-5),⁸ and some have been tested in different communities from which it was originally developed and the SOHO-5 has been validated in Indonesian language.⁹

The high prevalence of preschool children's caries in different countries, some studies evaluating Oral Health-Related Quality of Life (OHRQoL) in preschoolers using the Early Childhood Oral Health Impact (ECOHIS) aimed in assessing the effects of oral health problems.^{10,11} The ECOHIS questionnaire was developed to assess the impact of oral health problems and treatment given to the quality of children aged 3–5 years. Questionnaires are given to parents or caregivers who deal directly with the child. The ECOHIS questionnaire consists of 13 items of questions divided into 2 parts, the impact of oral health problems on the quality of life of children (questions 1–9), and the impact of a child's oral health problems on his family (questions 10–13).¹²

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ECOHIS has been validated in various countries such as Brazil, Lithuania, Spanish, Argentina, Arabia, Malaysia, and Australia as instruments to measure the impact of oral health problems on the quality of life of children and their families.¹³⁻²² Based on the background that has been described, the purpose of this study is to analyze the trans-cultural adaptation and validation of ECOHIS questionnaire which is translated into Indonesian and adapted to Indonesian culture that can be used as a questionnaire instrument to assess the quality of life of children and parents in Indonesia.

Methods

The original ECOHIS questionnaire was developed in English by Pahel *et al.*¹² which has been tested for validation and reliability. This research was divided into two stages: trans-cultural adaptation stage²³ and psychometric analysis.¹²

Stage of trans-cultural adaptation

At this stage, the ECOHIS questionnaire was transadaptated (*cross cultural adaptation*) from original language, translated into Indonesian and adapted to the Indonesian culture. The original English ECOHIS questionnaire was translated into Indonesian by an independent translator team, capable of both English and Indonesian and made up of experts. The adaptation process has six stages, stage 1 of early translation of the original language into Indonesian by some of the early translators. Each translator produces a written report of the translation both of the contents of the item and the choice of answers. Both translators must have different profiles or backgrounds. Stage 2 (*synthesis of the translations*), the result of the first translator (T1) and the second translator (T2) synthesized to be made into one translation in general ((T12). Stage 3 (*back translation*), at this stage a translator translates the result (T-12) to the original language, where the translator do not know the original language. The translation is also done by two translators called (BT1) and (BT2). Stage 4 (*expert committee*), the committees will see all the translations and find the differences that arise. The material discussed by the committee is the original questionnaire, and each translation has been done (T1, T2, T12, BT1, and BT2). The committee makes a

decision for the results of the questionnaire or measuring instrument that will used so as to achieve equality between the source of the measuring instrument and the new version. Stage 5 (*test of the prefinal version*), the final stage of the adaptation process is *pretest*. This is done as field testing of a new questionnaire or measuring instrument. Subjects who participated in the test measuring instrument is 30 people. The questionnaire was re-tested by administering it to the pilot sample, they were given the questionnaire again after 2 weeks later. This is done as field testing of a new questionnaire or measuring instrument (Indonesia-ECOHIS). The Indonesia-ECOHIS questionnaire was tested on parents/caregivers who had children aged 3–5 years to assess the validity of the questionnaire. Stage 6 is the delivery of the final results to the committee's coordinator for the assessment of the adaptation process. This is done to verify from the items used in the later test.²³

Stage of psychometric analysis

It relies on parental ratings of 13 items grouped in two main parts: part one is the child impact section and part two is the family impact section. In the child impact section, there are four domains: child symptoms (1 item), child functions (4 items), child psychology (2 items), and child self-image and social interaction (2 items). In the family impact section, there are two domains: parental distress (2 items) and family function (2 items). Response categories for each question are rated on a 5-point Likert scale to record how often an event has occurred during the life of the child: 0 = never; 1 = hardly ever; 2 = occasionally; 3 = often; 4 = very often; 5 = don't know.¹²

Psychometric analysis of Indonesia-ECOHIS was analyzed using internal consistency reliability, convergent validity, construct validity and discriminant validity. Convergent validity was evaluated based on Spearman's rank order correlations between the ECOHIS scores and the rating of the global oral health rating question, and between the child and family sections of the ECOHIS. Construct validity was examined by correlating ECOHIS scores with dmf-t, and discriminant validity was evaluated by comparing ECOHIS scores of groups that differ regarding the child's dental caries status.^{10,11}

Cross-sectional study design and sample

were obtained with total sampling. From the school data, sample obtained of 117 parents/caregivers who have children aged 3–5 years in early childhood in the district Meuraxa City Banda Aceh. Ethical approval for this study was obtained from the ethics committee of the Faculty of Medicine of North Sumatera, No. 27/TGL/KEPK FK USU-RSUP HAM/2018. Permission for schools obtained from the principal and written consent of the parent/caregiver for oral examination.

Data collection was performed by two dentists and an intraoral clinical examination was performed. Each child was subsequently provided with a baseline clinical examination by two calibrated examiners (inter-examiner κ = 0.93) using the criteria of the clinical status of the tooth.

Results

Overall, the caries status from 117 children found that 53.8% of them had ≥ 4 teeth with tooth caries. Moreover, dmft index showed very high with total 37 children. However, most of them were satisfied with their general oral health (Table 1).

Table 2 shows internal consistency reliability of 13 questions obtained by α Cronbach's value of 0.874 with a range of 0.856 to 0.870. In the reliability of the correlation coefficient of the total query of 13, the item correlation indicates a value greater than 0.30.

Table 3 shows inter item correlation I-ECOHis with lowest range is 0.100 and highest is 0.694. Reliability coefficient close to 1.00 means the measurement more reliable. The correlation of the questionnaire shows the correlation result of inter-I-ECOHis where the lowest range 0.100 in question 8 is avoiding smile, and the strongest correlation and the highest 0.694 in question 10 is the family becomes upset.

In Table 4, convergent validity and construct validity assessed with *Spearman* test. Result of correlation test between total of I-ECOHis with dental health status in general can be seen. In the convergence validity test, respondents were asked to answer the oral and dental health questions of the child as a whole, by responding satisfactorily, very well, good, moderate, bad, each with 1–5 points. ECOHis score of child and oral health status in general

obtained r value of 0.634 and $p \leq 0.05$, then for the family obtained correlation of 0.476, and the last in total ECOHis overall correlation is 0.645.

Characteristic	Frequency (n)	Percentage (%)
Age		
3 years	3	2.5
4 years	23	19.7
5 years	91	77.8
Total	117	100
Gender		
Male	62	53
Female	65	47
Total	117	100
Caries		
Caries free	28	24.0
1-3 teeth	26	22.2
≥ 4 teeth	63	53.8
Total	117	100
dmf-t index		
Very low	33	28.2
Low	16	13.7
Moderate	17	14.5
High	14	12.0
Very high	37	31.6
Total	117	100
General oral health		
Very Satisfy	22	18.8
Satisfy	68	58.1
Fairly Satisfy	14	12.0
Dissatisfied	9	7.7
Very dissatisfied	4	3.4
Total	117	100

Table 1. Characteristic of the Age and Gender of the Child.

The construct validity was obtained by the total correlation test of ECOHis for the children with the dmft score is 0.632, then for the family part got correlation equal to 0.432, and last the totally ECOHis correlation is 0.654.

In Table 5, Discriminant validity assessed by compare child ECOHis, parent and total based on number of caries category no caries, 1–3 teeth and ≥ 4 teeth. Statistic test used is *kruskal wallis* with 5% error. The result showed that the ECOHis comparison between the number of caries was obtained by p -value 0.001.

Impact	Corrected Item-Total Correlation	Cronbach' Alpha if Item Deleted
Child impact		
Pain in the teeth, mouth, or jaws	0.555	0.866
Difficulty drinking hot or colt	0.698	0.856
Difficulty eating some foods	0.560	0.864
Difficulty pronouncing any words	0.588	0.862
Missed preschool, daycare or school	0.498	0.867
Trouble sleeping	0.644	0.861
Irritable or frustrated	0.484	0.869
Avoided smiling or laughing	0.444	0.870
Avoided talking	0.438	0.870
Parent/family Impact		
Been upset	0.588	0.863
Felt guilty	0.587	0.862
Taken time off from work	0.547	0.865
Financial impact	0.565	0.864

Cronbach's alpha (0.874) I-ECOHS

Table 2. Internal Consistency Reliability Analysis of Total Indonesian-ECOHS Items.

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13
P1	1.000												
P2	0.590	1.000											
P3	0.653	0.533	1.000										
P4	0.360	0.438	0.430	1.000									
P5	0.265	0.444	0.265	0.516	1.000								
P6	0.454	0.639	0.420	0.474	0.554	1.000							
P7	0.237	0.271	0.230	0.370	0.448	0.386	1.000						
P8	0.386	0.453	0.429	0.326	0.122	0.381	0.53	1.000					
P9	0.288	0.364	0.353	0.337	0.196	0.326	0.160	0.813	1.000				
P10	0.221	0.401	0.178	0.300	0.386	0.364	0.519	0.155	0.215	1.000			
P11	0.222	0.415	0.233	0.274	0.262	0.330	0.473	0.100	0.512	0.694	1.000		
P12	0.300	0.407	0.332	0.324	0.230	0.340	0.147	0.197	0.163	0.431	0.609	1.000	
P13	0.283	0.319	0.210	0.369	0.147	0.235	0.426	0.178	0.193	0.568	0.633	0.658	1.000

Table 3. Inter Item Correlation of ECOHIS (I-ECOHS) Indonesia.

	Child impact		Family		Total	
	r	p-value	r	p-value	r	p-value
Dental health status	0.634**	< 0.001	0.476**	< 0.001	0.645**	< 0.001
dmf-t	0.632**	< 0.001	0.432**	< 0.001	0.654**	< 0.001

r: Spearman correlation coefficient; **: significant correlation with $P \leq 0.05$ (2 tailed)

Table 4. Convergent Validity and Construct Validity.

Variable Number of teeth with caries	n	Child mean	Family mean	Total mean
Free caries	28	30.54	41.82	29.80
1-3 teeth	26	47.13	55.00	47.63
≥ 4 teeth	63	76.55	68.29	76.67
p-value		<0.001	0.001	<0.001

Kruskall Wallis test, significant $P \leq 0.05$

Table 5. Discriminant Validity of I-ECOHIS.

Discussion

Adaptation of test kits is a process whereby the test equipment is translated from the original into one or more desirable languages. Trans-cultural adaptation is one of the processes in a *cross-cultural* study.²⁴ consists of translation and adaptation translated as a process whereby a scale or test tool that has been constructed in a particular language and culture is translated and adapted into another language by customizing the culture.²⁵ Validity test is the driving force of adaptation of test equipment. The purpose of the test is to determine the high and low of a validity used to interpret the results of the assessment of the test equipment to be interpreted.

The consistency or reliability of the measuring tool as a whole satisfies have meaning the higher the better the measuring tool used. Reliability is the accuracy and consistency or trust, meaning that the instrument used will give the same results, although repeatedly done by different subjects and time. Correlation of this interaction to measure the ability of each items by looking at the suitability of fellow items or other items. The higher the grain correlation with the other the better.²⁶ Calculation of coefficient *Cronbach's alpha* generated coefficient value and considered to have good reliability and shows the correlation result of inter-I-ECOHIS.

Convergent validity was assessed by correlation between total ECOHIS values with dental health status in general using *spearman* analysis. The *spearman* correlation test it can be seen that the biggest correlation is in total I-ECOHIS relationship followed by total of child part and total of family part. There was a significant correlation between the global question and each

of the total, child and family I-ECOHIS scores, as reported in other validation studies.^{10,13,16} The validity of the construct is important in the process of adaptation of the measuring instrument to provide evidence that adapted measuring instruments are familiar to the population in which the measuring instrument and the items in the measuring instrument are equivalent to the original measuring instrument.¹² Construct validity showed that there was moderate correlation between I-ECOHIS scores and caries experience (dmf-t) and these results proved the validity of the measurement. There were similar findings for the versions used in Turkey, China and Peruvian.^{10,19,20} However, Martins *et al.*¹¹ report that ECOHIS was significantly but weakly correlated to caries experience.

Discriminant validity, using *Kruskal Wallis* compares ECOHIS with another variable of caries category. The result showed that the I-ECOHIS comparison between the number of caries was significant. Discriminant validity of the I-ECOHIS is provided by the finding of higher ECOHIS scores on both sections among those with more than 4 decayed teeth compared with those who were caries free or had 1–3 decayed teeth. This finding is in agreement with a Brazilian study¹⁰ and Turkey,¹¹ which reported that children with dental caries experience, those with more severe dental disease obtained higher ECOHIS scores than those without dental caries. The I-ECOHIS and Indonesia SOHO-5 had the same result that children with high caries tend to have low quality of life.⁸ The differences in I-ECOHIS scores both per section and overall indicate that the I-ECOHIS instrument is discriminantly valid and shows valid results of the instruments used the discriminating power

or item difference is the parameter used to perform the item selective of the measuring instrument. The discriminating power indicates the extent to which item was able to distinguish between individuals who have attributes that are measured and which have no attributes measured.²⁶

Adaptation of a measuring instrument needs to be done when the psychological gauge is to be used in another country that has a different culture and language from the country in which the psychological measure is created. Therefore, it must be standardized again to ensure the quality of psychological measurement tools such as evaluating the validity, reliability, and norms so that after the process of adaptation on psychological measurement done; it is expected that the psychological measure is free of bias that can affect the data obtained.²⁷

Conclusion

The Indonesian version of ECOHIS Trans-cultural adaptation and validation (I-ECOHIS) can be used as a questionnaire instrument for Indonesians for further use because of internal consistency reliability, convergent validity, discriminant validity obtained valid in assessing the quality of life impact of early childhood oral health and their families. The I-ECOHIS questionnaire can be used for longitudinal studies in assessing the effectiveness of interventional treatment in oral and dental health.

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