

Indonesian version of caries management by risk assessment mobile application “SKOR GIGI” in highly educated parents

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ABSTRACT

Background: The Indonesian version of caries management by risk assessment (CAMBRA) is a common caries risk assessment for children aged 0–5 years. During the coronavirus disease 2019 (COVID-19) pandemic, the frequency of dental visits have decreased, making it difficult to assess the caries risk in children. Smartphones and operating systems such as Android are expected to be useful for parents to assess the caries risk of their children. The education level of parents has an impact of its use. The research about the Indonesian version of CAMBRA Android-based application in children aged 0–5 years with highly educated parents has never been done in Indonesia. **Purpose:** To analyze the accuracy of Android-based application “SKOR GIGI” in assessing the caries risk of children aged 0–5 years by highly educated parents. **Methods:** This study was conducted in kindergarten, pre-primary school, and Dental Hospital of Faculty of Dentistry Universitas Indonesia with 37 highly educated parents as participants. Participants filled out the informed consent and SKOR GIGI application. Six days later, dentists filled out the Indonesian version of CAMBRA. The results of this study were statistically tested to see the sensitivity, specificity, and the comparison between the variables. **Results:** The sensitivity test of SKOR GIGI application showed 96.3%, specificity 100%, positive predictive value 100%, and negative predictive value 90.9%. The comparative test with McNemar showed a *p*-value of 1.000, which means there is no significant difference between the caries risk assessment of children aged 0–5 years using SKOR GIGI application and the Indonesian version of CAMBRA. **Conclusion:** SKOR GIGI application can be used to assess the caries risk of children aged 0–5 years by highly educated parents.

Keywords: Caries risk; dental caries; dental health survey; dentistry; medicine

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INTRODUCTION

Caries risk assessment is important for child caries management and is applied on the first visit to a dental clinic. There are various caries risk assessment methods, including the Caries Management by Risk Assessment (CAMBRA) method.¹ Caries risk assessment according to CAMBRA is a combination of several etiological factors and caries protection such as diet, fluoride application, host resistance, and oral bacteria. These factors are related to daily and sociocultural habits. CAMBRA consists of two types, namely CAMBRA for children aged 0–5 years and CAMBRA for children aged 6 years and more. In Indonesia, it has been validated for the Indonesian version of CAMBRA for children aged 0–5 years.^{1,2}

Until now, caries risk assessment using CAMBRA has been conducted by dentists through face-to-face interviews, but in this era of the coronavirus disease 2019 (COVID-19) pandemic, this assessment is difficult to apply because of the limited patient visits to the dentist. Various efforts have been tried to make it easier for the public and dentists to communicate, one of those is by utilizing technology such as smartphone application. A survey conducted by the Ministry of Communication and Information of the Republic of Indonesia showed 66.3% of Indonesian citizens have smartphones.³ According to literature, the higher a person’s education, the higher the need and ability to use a smartphone.³ The 2021 survey found that 93% of people with a college degree or higher, owned a smartphone.^{4,5}

Caries risk assessment methods that are available in the form of smartphone application and computer software are Cariogram and Prediktor Karies Anak, but both are intended for the dentist. Currently, in Indonesia, there is no health application on smartphones for parents to assess the caries risk of children, therefore this research is conducted to analyze the Indonesian version of the CAMBRA Android-based application “SKOR GIGI” in assessing caries risk of children aged 0–5 years by highly educated parents.

MATERIALS AND METHODS

The research project was approved by the Dental Research Ethics Committee (63/Ethical Approval/FKGUI/X/2021). The participants of this research were highly educated parents who have children aged 0–5 years and have an Android-based smartphone. This study was conducted in kindergarten, pre-primary school and Pediatric Dentistry Specialist Dental Hospital of Faculty of Dentistry Universitas Indonesia with 37 highly educated parents as participants in November 2021. Participants filled out the informed consent and SKOR GIGI application. The study participants were selected by a simple random sampling method in accordance with the inclusion criteria namely highly educated parents of children aged 0–5 years and able to use Android-based smartphones. Previously, the Indonesian version of CAMBRA statement was simplified for the SKOR GIGI application then continued to take research data. Furthermore, the SKOR GIGI application is designed after the validity and reliability test of the statement.

After the participants filled out informed consent forms, they were asked to fill out the SKOR GIGI application. Six days later, dentists filled out the Indonesian version of CAMBRA. The results of this study were statistically tested to see the sensitivity, specificity, and the comparison between the variables. The comparative test with McNemar was done with Statistical Package for Social Science (SPSS) version 20.00 (IBM corporation, Illinois, Chicago, US).

RESULTS

The validity and reliability test of simplified statements was carried out using Cohen’s kappa which showed a value above 0.6 (0.692–1.000) while the reliability test

shows a value of 0.921 which means the statement is valid and reliable. The statement was then submitted into SKOR GIGI application.

Data was collected by asking parents to fill out SKOR GIGI application. Parents were also interviewed by dentists to fill out the Indonesian version of CAMBRA six days later. The data showed that the SKOR GIGI application has a sensitivity value of 96.3%, specificity 100%, positive predictive value 100%, and negative predictive value 90.9%. This shows that the SKOR GIGI application can be used as a tool to assess the risk of dental caries in children.

Data was then compared to analyze whether there is a significant difference of SKOR GIGI application and the Indonesian version of CAMBRA in assessing caries risk in children. A comparative test was carried out using McNemar test with p value = 1.000 ($p > 0.05$). This value means that there is no significant difference between the caries risk assessment in children aged 0–5 years using the Indonesian version of CAMBRA and the application of SKOR GIGI application (Table 1).

DISCUSSION

Caries risk assessment is important to do as the prevention of caries.⁶ CAMBRA is a method to assess the caries risk of children.¹ CAMBRA has more factors to be examined than other methods. The factors include almost all factors that play a role in the formation of caries.^{7,8} The Indonesian version of CAMBRA is a method most often used by dentists in Indonesia, therefore this research used the Indonesian version of CAMBRA for children aged 0–5 years as the gold standard.⁹

The current method to assess the caries risk can only be carried out by dentists by interviewing parents.⁸ During the COVID-19 pandemic, this assessment was difficult to be implemented because the dental visit of children and parents were decreased. The alternative way is by utilizing technology, such as a smartphone.⁵ Smartphones are currently considered as a primary need.¹⁰

Currently, there is no smartphone application that can be used by parents to assess the caries risk of their children. This research focuses on testing an Android-based smartphone application called SKOR GIGI which is intended for parents to directly assess the caries risk of children. An Android-based smartphone is the most used smartphone in Indonesia.⁵

Based on the survey, smartphones in Indonesia are most used by people with a higher education level.^{5,11} This shows

Table 1. Comparison between SKOR GIGI application and Indonesian version of CAMBRA in assessing caries risk in children aged 0–5 years

	SKOR GIGI application	Indonesian version of CAMBRA	p-value
High risk	26 (70.3%)	27 (73%)	1.000*
Low risk	11 (29.7%)	10 (27%)	

McNemar test: significant $p \leq 0.05$.

that the higher a person's education is, the better a person's ability to use a smartphone will be.³ Literature also states that people who have completed higher education, at least a diploma, will use smartphones more often in line with their needs in work or daily life.¹² Therefore, the participants of this research were highly educated parents who have children aged 0–5 years.

In this research, there was a gap of six days between the caries risk assessment by parents and dentists. The six-day gap aims to wash out the participant's memory so that when the caries risk assessment is carried out by the dentist, the participant will not be distracted by their answer in the SKOR GIGI application. It was in accordance with Ebbinghaus' Forgetting Curve which states that someone's memory will disappear on the sixth day.¹³ The SKOR GIGI application consists of a simplified statement from the Indonesian version of CAMBRA. This step was conducted because the application was intended for parents who are common people. The alteration of the statements is also based on the discussion by the expert council. The expert council discussion is one type of content validity test and must be carried out before a statement is tested on the participant.¹⁴ The expert council discussion involved three experts with doctoral degrees in the same field as the research conducted.^{14,15} The expert council discussion was conducted to see if the simplified statement could represent the medical language of the Indonesian version of CAMBRA. The results of the expert council discussion showed that the Content Validity Ratio (CVR) value is 0.99, which means the statement can be approved.

The simplified statement was tested on 20 participants by entering the statement into the Google form. Furthermore, the test–retest reliability using Interclass Correlation Coefficient (ICC) was carried out to see how far a measurement result is relatively consistent if the measurement is repeated twice or more.^{16,17} Test–retest reliability results show a value of 0.921 which is interpreted as an excellent agreement. A reliability value above 0.9 indicates a good result, so it can be said that the simplified statement for the SKOR GIGI application is reliable to use.

The validity of the statement was obtained by filling out the Indonesian version of CAMBRA by the dentist. A validity test is a test to see how far the accuracy of an instrument is in measuring something.¹⁶ In this research, the validity test was carried out with Cohen's Kappa statistical test on each statement. The results of the validity test showed that from 18 statements, three statements showed a kappa coefficient value above 0.6 and 15 statements showed a kappa coefficient value above 0.8. These results can be interpreted that each question has a substantial agreement and almost perfect agreement, so it can be said that the simplified statement for the SKOR GIGI application has a good validity.¹⁷

The simplified statements are then submitted into the SKOR GIGI application to get the research data by asking parents to fill out the application. If the answer to the statement is in accordance with the child's condition, then

the parent can fill in "Yes," and if the statement does not match the child's condition, the parent can fill in "No."

The results of the risk assessment are high, medium, and low, in accordance with the results of the Indonesian version of CAMBRA as the gold standard. During data collection, the results of the caries risk assessment in this application were hidden and could not be seen by the sample, so that the participants were not distracted by the results and changed the answers when they were interviewed by dentists. Clinical examination of children was also carried out during the Indonesian version of the CAMBRA interview. The results of the child's caries risk assessment as well as answers from parents on the application are recorded in the Firebase software which can only be seen by researchers.

From 37 participants who have filled out the SKOR GIGI application and participated in interviews and examinations for the Indonesian version of CAMBRA, 26 participants showed high results in filling out the Indonesian version CAMBRA and the SKOR GIGI application which is called a true positive. The sample that shows low results in the Indonesian version of CAMBRA and the SKOR GIGI application is ten people, also called true negative. The sample that shows high results in the Indonesian version of CAMBRA and low results in the SKOR GIGI application is one person, also called false negative.¹⁸

In this study, the caries risk results from both the SKOR GIGI application and the Indonesian version of CAMBRA were low and high risk. The literature states that at a higher level of parental education, parents' concern for the condition of their children's teeth and mouth increases. Parents will take better care of their children's oral hygiene so that the child's caries risk is low, but this condition can be the opposite of working parents. In parents with higher education, parents can be busier with work and activities outside the home. This can cause the oral hygiene to be neglected and the child's caries risk to be high.^{19,20}

The data collection shows the validity and reliability of the application. A new tool must be tested for validity and reliability before being used. The validity and reliability test showed sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV).²¹ According to the literature, instruments for assessing caries risk generally have sensitivity values between 29–70% and specificity 65–80%. Instruments that have sensitivity, specificity, PPV, and NPV values of 70–100% are included into good and very good instruments and are valid to use.^{22,23} In this research, the sensitivity value of the SKOR GIGI application is 96.3%, the specificity value is 100%, the positive predictive value is 100%, and the negative predictive value is 90.9%, so that the SKOR GIGI application is valid to assess the caries risk in children aged 0–5 years by highly educated parents.

According to a similar study, to find out whether an instrument can be used, it is necessary to do a comparative result to see the difference between the new instrument and the gold standard.²¹ In this research, the comparative

test used the Mc Nemar test because the data consisted of two paired categorical variables.²⁴ The results of the Mc Nemar test showed p value = 1.000 with a significance value $p \leq 0.05$, which means that there is no significant difference between caries risk assessment using the Indonesian version of CAMBRA and the SKOR GIGI application. Based on the result of this study the SKOR GIGI application can be used to assess the caries risk of children aged 0–5 years by highly educated parents.

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