

The development of early childhood caries impact on quality of life-Indonesia instrument as assessment instrument of dental caries impact on quality of life of children aged 3-5 years based on Indonesian community characteristics

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ABSTRACT

Background: Improvement of quality of life is one of objectives in establishment of healthcare system according to World Health Organization policy. Studies of dental health-related factors that influence quality of life of children aged 3-5 years have not been developed yet, particularly in Indonesia. Previous study which adopted international instruments has some limitations of inappropriate characteristics of question items with local community characteristics. Quality of life assessment could describe sociodemographic status and community cultural background, as well as varies of special characteristics in a community group, related to oral and dental health features with sensitivity to the difference of age group. **Purpose:** This study was aimed to develop early childhood caries impact on quality of life-Indonesia (ECCIQOL-INA) as assessment instrument of dental caries impact on quality of life of children aged 3-5 years based on Indonesian community characteristics. **Method:** Initially, this study was conducted qualitatively using Focus Group Discussion method, validity and reliability test, subsequently the study was continued using quantitative method as a cross-sectional analytical study to analyze the utilization of instrument in 309 children aged 3-5 years enrolled in kindergarten and early childhood education programs (ECEP) with their mothers at working area of Community Health Centre Wates in Mojokerto. **Result:** There were four question items as assessment instrument of dental health problems that impact on quality of life on children aged 3-5 years, i.e. "Has your child ever been irritable/restless?" ("Apakah anak Ibu pernah merasa rewel/gelisah?"), "Has your child ever refused to eat and drink or felt discomfort while eating and drinking?" ("Apakah anak Ibu pernah tidak mau atau tidak enak makan dan minum?"), "Has your child ever been absent from school?" ("Apakah anak Anda pernah tidak masuk sekolah?") "Has your child ever been difficult or unable to sleep?" ("Apakah anak Ibu pernah tidak bisa tidur atau sulit tidur?"). **Conclusion:** ECCIQOL-INA instrument had been successfully developed and could be utilized as assessment instrument of dental caries impact on quality of life on children aged 3-5 years based on Indonesian community characteristics.

Keywords: quality of life; dental caries; early childhood

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INTRODUCTION

Improvement of oral and dental health should be started as early as possible, because in toddlers and preschoolers it is such a crucial factor for the arrangement of further

dentition. In addition, it also affects children's ability to speak and their mastication. Various attempts to develop dental caries prevention and management keep continuing in many countries. Currently, dental caries prevention and management have shown a positive and dynamic

development, however dental caries problem still shows a high prevalence, particularly in developing countries.^{1,2}

Some studies in Northern Philippines and China found that early childhood caries prevalence ranged from 52.9% to 90%. Another study in Southern Brazil found that about 40% of preschoolers (0-5 years) has caries in their primary teeth. Moreover, some studies in Taiwan found a high prevalence of 57.69% in children aged 3 years.³ In some developed countries it also found high incidence of dental caries in children.^{1,2}

In a review of early childhood caries in Indonesia, according to study conducted in five urban communities of special capital region of Jakarta in 2008, it had been found that prevalence of early childhood was 52.7%.⁴ Another study conducted by the authors in Mojosari, East Java, found prevalence of dental caries in children aged 4-5 years was up to 91%, and 89% of them had untreated dental caries.⁵ Untreated dental caries has negative impacts that could lead to experience of pain and then affect children's appetite, sleep disturbance, which could impact upon children's growth process. Chronic inflammation process of dental caries also could affect the cycle of red blood cell production.^{6,7}

Attempt to obtain assessment of comprehensive oral and dental health by observation in individual and community group not only about the disease status, but also physical, psychological, and social function, as well as health satisfaction. In addition to that, it could be emphasized about the importance of concerning quality of life aspect in planning and assessing the effectiveness of oral and dental health programs. Quality of life assesment could give an addition of strong dimension in planning and health promotion program. It is related to consideration of someone's efforts in receiving explanation about oral and dental health program in order to improve quality of oral and dental health.⁸⁻¹⁰

Improvement of quality of life is one of objectives in establishment of healthcare system according to World Health Organization policy. The plan of dental caries prevention and management is not only concern to clinical impact, but also to assessment and measurement of impact on quality of life. As the pattern of life continues to develop, chronic oral and dental problems and developing symptoms as well as some effects caused by those problems require assessment method of social and psychological chronic impacts.⁸

Early prevention concept is still not facilitated yet by the development of assessment instrument of oral and dental health-related children's quality of life, particularly children aged under 5 years compared to the development of instrument in the older children.¹¹ Children aged under 5 years have special characteristics, i.e considering psychological development status of early childhood, they still could not interpret the questions of assessment instrument of quality of life. Therefore, parent is considered to be more effective to complete the assessment of their children's quality of life.^{7,12}

Unlike with observation of factors related to dental caries incidence in children, studies about factors that influence dental health-related quality of life of children aged 3-5 years have not developed yet, particularly in Indonesia. Previously study employing adopted international instruments has some limitations of inappropriate characteristics of question items with local community characteristics. According to some studies about factors that influences the assessment of children's quality of life, it had been found that majority of study population focused on school-age children. One thing that could potentially describe it is the lack of development of assessment instrument for dental health-related quality of life of children, especially in early childhood group.^{7,12} Presently, study had developed oral health related quality of life-children 5 (OHRQoL-C5) instrument as assessment instrument of quality of life of primary school-age children and had been tested in children aged 6-7 years.¹³

Based on the discussion above, there is a need to develop assessment instrument of quality of life with consideration to cultural background of Indonesian community, especially in children aged under 6 years. This is in accordance with observation by John *et al.* and Al Shamrany which stated that assessment of quality of life could describe sociodemographic status and community cultural background, as well as varies of special characteristics in a community group, especially concerned with age group. It was related to oral and dental health features with sensitivity to the difference of age group.¹⁴⁻¹⁵ Step in development of questionnaire to assess quality of life of children aged 3-5 years in accordance with characteristics of Indonesian community is based on that of previously studies have been done in some countries.^{7,12,16}

In order to fulfill such need, so this study was aimed to develop early childhood caries impact on quality of life-Indonesia (ECCIQOL-INA) instrument as assessment instrument of dental caries impact on quality of life of children aged 3-5 years based on characteristics of Indonesian community.

MATERIALS AND METHODS

Initially, this study was conducted qualitatively using focus group discussion method, validity and reliability test. Subsequently the study was continued using quantitative method as a cross-sectional analytical study to analyze the utilization of instrument in 309 children aged 3-5 years enrolled in kindergarten and early childhood education programs (ECEP) including their mothers at working area of Community Health Centre Wates in Mojokerto. That area was chosen in relation with development of dental health promotion programs by community health center, because prevalence of early childhood caries was still found more than 70% although community health center had conducted dental health promotion program for children and mothers during 4 years.

Mother's attitude regarding children's dental health was mother's response about children's dental health, shown by the mean score of mother's chosen answers about aspect of knowledge in maintaining children's dental health, children's dietary habit, and children's dental visit.^{17,18} The answer choices to each question item on mother's attitude instrument regarding children's dental health were "Strongly disagree", "Disagree", "Agree", and "Strongly agree", with score ranged from 1 to 4. Measurement of dental caries on children was the number of carious primary teeth, missing teeth due to caries, and filled teeth. Assessment of children's quality of life was the assessment of mother's perception about impaired quality of life of children as impact of dental health problems, shown by the mean score of children's quality of life measurement. The assessment involved three aspects: physical symptoms aspect, functional aspect, and children's psychological aspect. Questionnaire about impact of children's quality of life was adapted and developed based on synthesis of some assessment instrument of children's quality of life that had been developed previously, i.e early childhood oral health impact scale (ECOHIS), self-reported scale of oral health outcomes for 5 year-old children (SOHO-5), and oral health related quality of life-children 5 (OHRQoL-C5).^{7,12,13,19}

Assessment instrument of dental health problem impact on quality of life of children aged 3-5 years employing in this study had passed validity and reliability test series. Assessment was obtained from parent's perception, particularly mother, the one who had the major role in early childhood care, as the first social environment of children. Parent is considered able to recognize and understand early childhood problems such as pain, sleep disturbance, and any discomfort feelings due to early childhood caries. It was thought due to psychological development status of early childhood which still could not interpret the questions in assessment instrument of quality of life. Parent could be the source of good and valid information to obtain the assessment of quality of life in early childhood.^{7,12}

Development of questionnaire to assess quality of life of children aged 3-5 years in accordance with characteristics of Indonesian community was based on that of previously had been done in some countries.^{7,12,16} The first step was through focus group discussion (FGD) to know and determine the topic of constructs in development of measurement instrument of dental caries status-related quality of life in early childhood. FGD was carried out in a group of mothers, whose children had dental caries. In that group, there were 7 purposively selected respondents. FGD was carried out according to instrument that had been used and published in some references. After determining the topic, then the draft of question items in measurement instrument was composed, followed by feasibility test of contents and the composition of instrument. Feasibility test was conducted by interview or discussion with dentist, pedodontist, and public health dentist to know comprehensiveness, relevance ranking, and clarity. Total number of respondents was 10 selected by purposive sampling. The draft of question items

in instrument that had passed the feasibility test by dental experts, subsequently tested its feasibility by mothers whose children had early childhood caries. This test was aimed to know comprehensiveness, relevance ranking, clarity, addition, understanding, and readability. Total number of respondents was 10 selected by purposive sampling. The draft of question items that had passed feasibility test both by experts and mothers of children with early childhood caries, then had to pass the validity and reliability test to get the final question items composition for measurement instrument of dental health problems impact on quality of life of children aged 3-5 years. This involved 55 respondents.

Prior to start the process of completing questionnaire and dental examination in children, the mothers who agreed to get involved in this study as study sample, were given informed consent to be filled and signed. This study had been through the application procedure of ethical clearance and approved by Medical and Health Research Ethics Committee Faculty of Medicine Universitas Gadjah Mada.

RESULTS

The result of FGD found that there were 4 aspects in frequently impaired daily life of children due to dental caries. They were the condition of irritable or restless children, discomfort or refuse to eat or drink, absent from school and difficult to sleep. These 4 aspects were in accordance with the previous study, although there were some different aspects such as feelings of inferiority among their friends, difficulty in speaking and smiling.^{5,11,17} Those 4 aspects then be arranged in a draft of question items consisted of: a) "Has your child ever been irritable/restless?" ("Apakah anak Ibu pernah merasa rewel/gelisah?"); b) "Has your child ever refused to eat and drink or felt discomfort while eating and drinking?" ("Apakah anak Ibu pernah tidak mau atau tidak enak makan dan minum?"); c) "Has your child ever been absent from school?" ("Apakah anak Anda pernah tidak masuk sekolah?"); d) "Has your child ever been difficult or unable to sleep?" ("Apakah anak Ibu pernah tidak bisa tidur atau sulit tidur?"). The draft of question items was considered relevant by those dental experts as respondents of feasibility test for that instrument, and also considered clear and readable by mothers of children aged 3-5 years with dental caries.

The result of reliability test showed that assessment instrument of quality of life of children aged 3-5 years employing in this study had Cronbach's Alpha score as 0,867 or more than critical value for two-tailed correlation coefficient with the number of sample by 55 subjects, i.e $r=0,261$. Therefore, those question items were considered internally reliable. External reliability test was conducted by comparing respondent's answer in the first and second assessment of question items. Interval between the first and second assessment was 3 weeks. Reliability test and

re-test used Wilcoxon test for ordinal and nominal data. From all question items in instrument, it had been found that the difference between the first answer and the second answer, 3 weeks after the former, were not significant with $p > 0,05$.

Validity test was conducted by comparing (r)-value from each item with Pearson's critical value r in two-tailed. The result of validity test for each question items found that overall of critical value ($r = 0,261$) was more than critical value (r) for 55 samples, and therefore those question items were valid (Table 1).

Question items in assessment instrument of dental health problems impact on quality of life of children aged 3-5 years that had passed validity and reliability test were as follows, "Has your child ever been irritable/restless?" (*"Apakah anak Ibu pernah merasa rewel/gelisah?"*), "Has your child ever refused to eat and drink or felt discomfort while eating and drinking?" (*"Apakah anak Ibu pernah tidak mau atau tidak enak makan dan minum?"*), "Has your child ever been absent from school?" (*"Apakah anak Anda pernah tidak masuk sekolah?"*) "Has your child ever been difficult or unable to sleep?" (*"Apakah anak Ibu pernah tidak bisa tidur atau sulit tidur?"*). Answer choices to the question items in that instrument were "Yes, he/she has" and "No, he/she hasn't". "Yes, he/she has" answer had score 1 while "No, he/she hasn't" had score 2.

In this present study of developed instrument utilization, the gender distribution was likely similar between boys and girls, with total number of boys was 159 (51.5%), and girls was 150 (48.5%). Table 2 shows that majority of mothers (88,7%) as respondents had been through formal education during more than 9 years. Distribution of average monthly household expenses groups was higher in average

monthly household expenses >Rp1.485.000 group, that was two-fold higher than average of monthly household expenses in Indonesia based on Statistic Indonesia 2014, Rp. 1.485.000,-. Majority of mothers (81.6%) had and lived in the same house with 1-2 children.

Table 3 shows that based on mothers' assessment, being irritable or restless was the most common impact on quality of life of children with dental caries. In assessment of 4 aspects regarding impacts on quality of life, we found that children whose quality of life had ever been impaired, had the higher number of dental caries, and the poorer mother's attitude on children's dental health than children whose quality of life had never been impaired.

Overall in all aspects of dental caries impacts on children's quality of life, we found that the number of dental caries had a significant influence on quality of life of children aged 3-5 years. In assessment of mother's attitude on children's dental health, overall it is also found a significant influence on aspects of dental caries impacts on children's quality of life. Overall significance of the differences in test result between ever and never being impaired in the number of dental caries variable and value of mother's attitude on children's dental health variable, i.e less than 0.05. In correlation test between the number of dental caries and the value of quality of life, it is found that the number of dental caries had a significant strong negative correlation with quality of life ($p < 0,05; r = -0,808$), i.e the higher the number of dental caries in children, the poorer the quality of life they would have. This result also could be applied in correlation between mother's attitude on children's dental health and children's quality of life, that we found both of them had a significant strong positive correlation ($p < 0,05; r = 0,626$), between so the better mother's attitude on children's dental health, the better quality of life of their children.

Table 1. Validity coefficient in assessment of children's dental caries impact on quality of life

Impacts on quality of life	n	Validity Coefficient
Has your child ever been irritable/restless? (<i>Apakah anak Ibu pernah merasa rewel/gelisah?</i>)	55	0,819
Has your child ever refused to eat and drink or felt discomfort while eating and drinking? (<i>Apakah anak Ibu pernah tidak mau atau tidak enak makan dan minum?</i>)	55	0,719
Has your child ever been absent from school? (<i>Apakah anak Ibu pernah tidak masuk sekolah?</i>)	55	0,486
Has your child ever been difficult or unable to sleep? (<i>Apakah anak Ibu pernah tidak bisa tidur atau sulit tidur?</i>)	55	0,872

DISCUSSION

Dental caries in children has such negative impacts on their quality of life compared to those with no dental caries. This is related to pain as the result of inflammation process in dental caries, discomfort feelings, and limited function of teeth, and psychological impairment. Children with early childhood caries more likely feel discomfort while

Table 2. Distribution of study respondents' characteristics at working area of Community Health Centre Wates in Mojokerto

Socio-economic variable	Group	Frequency
Mother's formal education	≤ 9 years	35 (11,3%)
	>9 years	274 (88,7%)
Average monthly household expenses	≤ 1.485.000	105 (34%)
	>1.485.000	204 (66%)
Number of children living in the same house	>2 anak	57 (18,4%)
	≤2 anak	252 (81,6%)

Table 3. Distribution of children's dental caries impacts on quality of life, the test result about the number of dental caries, and the value of mother's attitude on children's dental health

Impacts on quality of life	Event	Frequency	Dental Caries		Significance of test in different dental caries	Value of mother's attitude on children's dental health		Significance of test in different mother's attitude on children's dental health
			Mean	SD		Mean	SD	
Has your child ever been irritable/restless? (Apakah anak Ibu pernah merasa rewel/gelisah?)	Yes, he/she has	159 (51,5%)	10,566	4,576	0,000	2,546	0,604	0,000
	No, he/she hasn't	150 (48,5%)	4,967	3,726		2,991	0,532	
Has your child ever refused to eat and drink or felt discomfort while eating and drinking? (Apakah anak Ibu pernah tidak mau atau tidak enak makan dan minum?)	Yes, he/she has	130 (42,1%)	11,408	4,607	0,000	2,431	0,607	0,000
	No, he/she hasn't	179 (57,9%)	5,263	3,529		3,002	0,491	
Has your child ever been absent from school? (Apakah anak Ibu pernah tidak masuk sekolah?)	Yes, he/she has	73 (23,6%)	12,986	4,529	0,000	2,211	0,638	0,000
	No, he/she hasn't	236 (76,4%)	6,259	4,019		2,932	0,491	
Has you child ever been difficult or unable to sleep? (Apakah anak Ibu pernah tidak bisa tidur atau sulit tidur?)	Yes, he/she has	102 (33%)	11,726	4,672	0,000	2,365	0,625	0,000
	No, he/she hasn't	207 (67%)	5,937	4,005		2,958	0,501	

eating and has ever been absent from school.^{10,20} Impaired children's quality of life aspects due to dental caries are learning and playing activities, mastication process, social, and sleep activities. Other observation also found phonetic impairment, and impaired growth and development in early childhood due to severe dental caries.^{7,11,20}

Impact on such functions due to oral and dental health impairment could occur regardless of age, it is just a few difference about the type of activities they had. In early childhood, oral and dental health impairment could lead to pain and discomfort in oral cavity, impaired mastication, phonetic impairment especially for certain words, impaired playing and learning activities, as well as sleep disturbance.^{21,22}

The basic thing that should be fulfilled by an instrument is its substances should be able to find out information required in a study. It could be achieved by referring to empirical concept or determined indicators. The development process of measurement instrument of oral and dental health-related quality of life begins with determine the problem and variables as clear and spesific indicator to

describe dimension of measurement concept. Determination of indicator is based on basic review about WHO's quality of life concept, i.e health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.^{8,9,23}

The next step is formulating the relevant criteria to each dimension in sort of question component in quality of life measurement instrument. This could be done based on review of experts group, supported by studies from literature reviews. Question component formulation that has been composed as the result of review from experts and references, then is evaluated for its clarity and readability, relevance, and correlation between question component by subjects of study. The next step is a step to ascertain the reliability and validity of question component formula that has been evaluated for its clarity and readability, relevance, and correlation between question component.¹⁶

Research instrument intends to function as measurement tool designed to obtain information data about varies of characteristics in study variables. Research instrument and its quality have an important role in affecting quality of data

or study result, therefore an instrument must be accountable scientifically. Moreover, research instrument must be met reliability and validity criteria to produce accurate and objective information or data.^{12,16,19}

The study result of number of children's dental caries and value of mother's attitude on children's dental health showed that there was a significant influence. It was confirmed by the result of correlation test that found number of dental caries and mother's attitude on children's dental health had a significant correlation with children's quality of life. Analysis result showed that instrument employing in this study could provide a consistent result with general analogy about correlation between number of caries and mother's attitude on early childhood quality of life.

Problems in children's daily activities due to dental caries is manifestation of oral and dental tissue in whole body tissue system. Oral and dental tissue in body tissue system play a role in nutrition supply and social interaction. Impairment in oral and dental health could impact the overall body function or in other words, that impairment could influences quality of life.^{6,10,21,22}

The measurement of oral and dental health-related quality of life is an assessment of health impacts particularly on oral and dental health. This assessment is conducted by analyzing functional, social and psychological impacts as well as any discomfort feelings due to oral and dental problems.

Quality of life assessment as a multidimensional construct is found in oral and dental health report by United States Surgeon General's report, as quoted by Al Shamrany,¹⁵ that quality of life is a multidimensional construct that reflects (among other things) people's comfort when eating, sleeping, and engaging in social interaction, their self-esteem, and their satisfaction with respect to their oral health.

Assessment of oral and dental health-related quality of life in addition to the current concept generally used, is sort of analysis of respondent's answers to the questions in quality of life measurement instrument.¹⁵ That measurement is multidimensional and including physical, social, emotional, and cognitive well-being, correlation with their position and occupation, psychological aspect in relation to variety of disease symptoms, and financial impact.^{15,23,24}

Quality of life concept is a sort of correlation between oral and dental status with social and psychological well-being affected by someone's value and cultural background, then it is known the need to develop assessment instrument of quality of life based on any community's cultural background, and any characteristics, particularly age-based characteristic.¹⁵ Assessment of quality of life could describe sociodemographic status in a community group, especially concerned with age-based group. It is related to oral and dental health features with sensitivity to the difference between age-based group.²⁴ Quality of life assessment instrument was developed in adult group, and

also has been developed and adapted in children group. The development of quality of life assessment instrument for children had special characteristic, particularly children aged under five years.^{7,12,15}

Not all aspects in quality of life assessment for adult could be applicable in early childhood group. In the context of early childhood, there are aspects that more concerned with assessment of physically, socially, and psychologically impacts, interpreted in assessment of quality of life in early childhood regarding to eating and drinking activities, regular playing and school activities, sleep activity, and confidence to smile.¹⁹ In conclusion, ECCIQOL-INA instrument had been successfully developed and could be utilized as assessment instrument of dental caries impact on quality of life of children aged 3-5 years based on Indonesian community characteristics.

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