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Association of Malnutrition Based on Body Mass Index with A Presence of Oral Disease

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ABSTRACT

Background: To maintain oral health, the body needs good nutrition. The relationship between nutritional status and oral health conditions is very complex, influenced by many factors, both internal and external. Inadequate nutrition can increase the risk of oral disease. **Objective:** To analyze the association between malnutrition with bleeding gum, tooth mobility, and toothache. **Methods:** This study used the cross-sectional analytic observational design. Data were collected from the Manarul Huda Islamic Boarding School in Bandung, which 38 participants were selected based on criteria. Body mass index perform to asses nutritional status, while oral disease was collected through form data. Analysis's data using chi-square and SPSS 23 version. **Results:** Classification of body mass index the highest in undernutrition group (47.4%) and oral disease the highest for bleeding gum (44.7%), there was no significant association between malnutrition and oral disease with p value >0.05 . **Conclusion:** Early analysis of nutritional assessment reduced oral disease. Further assessment will be needed to determine the long-term oral health effect of malnutrition.

Keywords: Body mass index, malnutrition, oral disease

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INTRODUCTION

Malnutrition term is used to describe deficiency, excess, or imbalance of various nutrients, resulting in adverse effects on body composition, homeostasis, and functions.¹ In modern times, malnutrition is still a major public health issue. A greater chance of dying from degenerative diseases in middle age, but being underweight increases the risk of dying from infectious diseases at the young age.² Linear growth spurts can occur at any age, despite the fact that the first 1000 days are crucial for future growth and development, as well as the most essential time for intervention to prevent stunting, linear growth spurts can occur at a later age and may restore stunting, especially throughout adolescence, providing another opportunity for focused interventions to break the genetic cycle of starvation.³ Many developing countries have had rapid improvements in nutritional status in recent decades. However, the prevalence of malnutrition remains a serious problem as well as obesity is increasing substantially.⁴ Infection and malnutrition are common in countries with inadequate health care policies particularly in remote village and show a synergistic relationship. Malnutrition increases infection-related morbidity and mortality.⁵

Children with poor nutritional status or malnutrition have a higher probability of dental caries than children with normal nutritional status.⁶ The number of dental functional units were significantly associated with poor nutritional status.⁷ The bodies requires certain essential elements in small amounts and their absence or excess can be generated by severe body function failure and even death, because these essential elements directly affect the body's metabolic and physiological processes. Malnutrition can cause to decreased immunity, increased susceptibility to various oral and systemic diseases, impaired growth and development both physically and mentally, and decreased function. Nutrition affects oral health, craniofacial development and maintenance of the oral soft tissues.⁸ Malnutrition is common among elementary school children. Appropriate

screening in school health programs and proper nutrition in educational programs can be recommended as early as possible.⁹ To assess nutritional status, body mass index measurement is commonly used. Body mass index was carried out to identify the influence of diet, namely healthy food versus unhealthy food.¹⁰ Poor intake and nutritional status, leading to decreased resistance to infection and consequently an increase in disease burden.¹¹ Many factors influence oral disease such as tooth loss, including oral hygiene practices, trauma, bad habit such as smoking, socioeconomic status and individual background. Tooth loss interferes with the quality of life, including eating process because most foods require a perfect masticatory function.¹²

Many studies have analyzed the relationship between malnutrition and oral health in the elderly. Malnutrition and poor oral health are a major concern for global health, especially among the older population, while in the pediatric population studies are still rare. In children, it is an effective period in analyzing the association between malnutrition and the presence of oral diseases so that preventive measures can be taken immediately. Further research is needed to elucidate the role of malnutrition in oral disease.

MATERIALS AND METHODS

This study was conducted at Manarul Huda Islamic Boarding School in Bandung on early March 2021 to 38 students, aged 9–14 years and were in the fourth until nine grades of primary school. The study is an analytic observational with a cross sectional design. Prior to data collection, all participants initially were explained the purpose and objective of the study and the procedures involved in participating, and declaring confidentiality of the data and anonymity of subjects and permission was taken to conduct this study, and then participants was asked by filling an informed consent.

BMI calculations were used for assess nutritional status. Measurement of height and weight was taken, and then the weight of BMI (kg)/height (m²) was calculated. Measurements are based on the World Health Organization (WHO) classification into underweight (≤ 18.4 kg/m²), normal (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²) and obese (≥ 30.0 kg/m²). Body weight is measured using a body scale. Prior to the start of the examination, the scale was tested for accuracy and calibrated. Heavy clothes and accessories were asked to be removed from respondents. The respondent is instructed to stand on the scale after it has been turned on and appears to be zero. The weight is then recorded. The procedure was repeated 2 to 3 times and measurements were recorded by calculating the average. Height is measured using a stature meter. Respondents were asked to stand in an anatomical position. The respondent's head is horizontally positioned in the Frankfort area; the head plate is lowered so that it touches the top of the respondent's head. This procedure is repeated 2 times and measurements are recorded by calculating the average.

In this kind of pandemic, oral disease obtained by the primer data collection from data form of oral health complaint that consists of presence: bleeding gum, tooth mobility, and toothache. The data form consisted of questions about the participant's current oral health condition, which were identified from perceptions of perceived oral health problems. The participants identified oral disease based on symptomatic, namely bleeding gums, tooth mobility, or toothache. Bleeding gums can be assessed when brushing teeth. Blood that comes out when brushing teeth or when touched by objects that enter the mouth. Tooth mobility are identified by feeling the teeth loose when pressing with the tongue or fingers. Toothache is identified based on the description of pain that comes and goes, pain when chewing food, a toothache that will disappear spontaneously without professional treatment, or severe toothache so that can't eat and even sleep. The

definition of each disease was explained in advance to all participants on the information sheet distributed.

SPSS 23.0 software was used to process and analyze the data. P value < 0.05 were considered as significant. 95% confidence intervals were reported.

Ethical issue was approval obtained from The Health Research Ethics Committee (reference: 08/KEPK-Unisba/XII/2020), Faculty of Medicine, Universitas Islam Bandung.

RESULTS

Data on the body mass index are shown in Table 1. There were more participants in the underweight (47.4%) classification than participants in other classifications.

Table 1. Body Mass Index

Classification	BMI	n
Under weight	≤ 18.4	18 (47.4%)
Normal	18.5-24.9	17 (44.7%)
Over weight	25-29.9	1 (2.6%)
Obesity	≥ 30.0	2 (5.3%)

Table 2 present the oral disease among participants. Toothache (44.7%) was significantly more than other oral diseases. Rate of tooth mobility was the least.

Table 2. Oral disease

Oral disease	Presence	Absence
Bleeding Gum	16 (42.1%)	22 (57.9%)
Tooth mobility	14 (36.8%)	24 (63.2%)
Toothache	17 (44.7%)	21 (55.3%)

Associations was strongest within a bleeding gum and undernutrition status, but statistically no a significant interaction was apparent ($p=0.238$). There were no statistically significant differences for those in malnutrition and oral disease. None of the potential nutritional status has a consistent effect on the risk of developing oral disease. (Table 3)

Table 3. Associations between malnutrition and presence of oral disease.

Oral disease		Normal	Malnutrition	P-value
Bleeding Gum				
Presence	1 6	6	10	0.238
Absence	2 2	11	11	
Tooth mobility				
Presence	1 4	6	8	0.78
Absence	2 4	12	12	
Toothache				
Presence	1 7	7	10	0.821
Absence	2 1	11	10	

DISCUSSION

Our study analyzed the association of malnutrition with oral disease. We found that the relationship between malnutrition and oral disease did lead to a body mass index in the underweight category. Similar to other study, we found that the effects of undernutrition were stronger with dental caries. Malnutrition is prone to dental and oral diseases, and conversely, poor oral health can lead to malnutrition. Dental caries, which is an oral disease, and nutritional status showed a different relationship in the studied population, influenced by the sociodemographic profile of the family. Malnutrition can affect the body's homeostasis, so that it can indirectly lead to the development of oral disease, by reducing resistance to microbial biofilms and reducing tissue healing ability. Studies conducted by Sheetal et al. have shown that enamel hypoplasia, salivary gland hypofunction and changes in salivary composition may be mechanisms of caries-related malnutrition.¹³ Malnutrition negatively affects the development of craniofacial structures and teeth. Deficiency of nutrients during amelogenesis and dentinogenesis leads to the destruction of tooth structure, which tends

to be a source of cariogenic bacteria. Improper nutrition deprives children of essential nutrients for growth and development, including the structure of the oral cavity.¹⁴ Malnutrition and oral disease in early childhood are persistent and interrelated global health challenges, especially in remote villages with inadequate health facilities. However, statistically it did not show a significant relationship, this could be influenced by the number of research subjects and the method of collecting data based on respondents' complaints.

Dental and oral disease predicts poor nutritional status.¹⁵ In this study, many students complained about bleeding gum, especially when brushing their teeth, which made them panic when blood came out when gargling. However, few of them are aware that this can happen because of problems in the mouth such as dirt in the form of plaque and calculus caused by poor oral hygiene. In addition to bleeding gum, Inadequate oral prophylaxis also causes tooth mobility. If there is tooth mobility then the possibility of inflammation of the gums even due to periodontitis. Periodontitis is a chronic inflammatory condition that develops when a dysbiotic microbial plaque biofilm forms under the gingival margin. The biofilm and the deleterious immune inflammatory response are a high risk for the damaging process. Other causes are individual genetics, lifestyle, bad habits, nutritional intake and environmental factors. Dietary nutrients are necessary for survival because they provide an important source of energy in the form of macronutrients, essential cofactors in the form of micronutrients, which influence the action of enzymes during the regulation of anabolic and catabolic processes in human cells. The role of micronutrients is very good in human physiology and reduces the risk of periodontal disease.¹⁶ Brushing teeth one of the hygiene practices that need to be considered. Another study stated that an increased risk of periodontitis, DMFT (lost teeth) was associated with an increase in Body Mass Index.^{17,18}

Children's oral and dental common problems include soft tissue lesions, inflammation, odontogenic disease, dental caries, periodontal disease (gingivitis and periodontitis), malocclusion, and traumatic injury to teeth. While benign epithelial or soft tissue diseases, secondary trauma lesions, and oral signs and symptoms of systemic disease are all present in oral tissues, malignant lesions in children are uncommon.^{19,20} The oral health status of children, including tooth decay, periodontal disease, calculus, bleeding gums, and general oral hygiene are very poor.²¹ The study shows many students complain about toothache, especially when eating, this is mostly caused by cavities. Cavities that are not treated will cause them to expand and deepen, so it will press the nerves that cause toothache. Obesity and dental caries are complex disorders with similar risk factors. Studies around the world report mixed results on the relationship between dental caries and obesity.²² An oral examination can uncover signs and symptoms of immunologic illness, endocrinopathy, hematological conditions, systemic infections, and nutritional disturbances. The incidence of cavities is also possible by enamel dysplasia caused by malnutrition in the first years of life, and malnutrition-related oral manifestations. The mouth cavity is involved in a variety of physiological activities, including digestion, breathing, and phonation. Common symptoms are frequently preceded by oral signs. It is important to know the relationship between systemic health, one of which is malnutrition and oral health.²³

Few studies have explored whether the oral disease have impact of nutritional status, although this has been posited factors may influences. Unlike other studies, we found no difference in the association between malnutrition and the incidence of oral disease. Further research should be carried out aiming to explore the variables that might influence more closely; such as, diet and intensity of physical activity.

Limitations are recognized, due to the limited sample data and the pandemic period, there is a risk of primary data collection in the form of direct oral examination.

CONCLUSION

This study shows that malnutrition is common in children. Many participants complained about oral disease, especially toothache. Toothache is a symptom caused by various kinds of problems with the teeth. Poor dental health is significantly linked to malnutrition, despite the fact that no definitive causality can be shown. Health screening and proper nutrition education programs in Islamic Boarding School can be recommended as early as possible.

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Comparison Between Antibacterial Extract of Gambier (Uncaria gambir Roxb) and Chlorhexidine 2% to Enterococcus Faecalis

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ABSTRACT

Background: In the case of reinfection after endodontic treatment, *Enterococcus faecalis* is a bacterium that is commonly found in root canals. Irrigation was carried out to eliminate *Enterococcus faecalis* from the root canal. Chlorhexidine 2% irrigating agent was effective in reducing the growth of *Enterococcus faecalis* bacteria and fungi, but it could not dissolve tissue. Gambier extract (*Uncaria gambir* Roxb) has antioxidant and antibacterial with phenolic content in the form of catechins. **Objective:** Describe the antibacterial comparison of gambier extract (*Uncaria gambir* Roxb) and 2% chlorhexidine against *Enterococcus faecalis* bacteria. **Methods:** This research is a laboratory experimental research. *Enterococcus faecalis* ATCC 29212 is a microbiological sample. Extract of gambier (*Uncaria gambir* Roxb) with concentrations of 1%, 1.5%, 2%, 2.5%, and 3%. 2% chlorhexidine solution and a paper disc to measure the inhibition zone were placed on a petri dish containing Mueller-Hinton agar medium, and incubated 1x24 hours. Gambier extract was made by maceration and rotavapor methods. **Results:** Gambier extract (*Uncaria gambir* Roxb) and 2% chlorhexidine affected the growth inhibition of *Enterococcus faecalis* bacteria by forming a clear zone around the paper disc in each petri dish. Concentration of 3% is the largest value of the inhibition zone formed in the extract of gambier (*Uncaria gambir* Roxb), while chlorhexidine 2% shows the largest inhibition zone, this can be seen from the average inhibition zone formed of 17.20 mm. **Conclusion:** There are differences in the antibacterial of gambier extract (*Uncaria gambir* Roxb) and 2% chlorhexidine against *Enterococcus faecalis* bacteria.

Keywords: *Enterococcus faecalis*, 2% chlorhexidine, gambier extract (*Uncaria gambir* Roxb).

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INTRODUCTION

Endodontic treatment is the treatment of pulp disease by removing bacteria and their metabolic products from the root canal system. The purpose of endodontic treatment are to clean and disinfect the root canal system so it can reduce bacteria, remove necrotic tissue, and assist the periapical healing process.¹ Endodontic treatment can be divided into three main stages: access, preparation, and obturation.²

One of the steps of biomechanical preparation in endodontic treatment is root canal irrigation which aims to eliminate bacteria in the root canal. Root canal irrigation has two purposes, mechanical and biological. The mechanical purpose is to remove debris, lubricate the root canal and remove organic and inorganic tissue while the biological purpose is as an antimicrobial.³

To choice of irrigation solution need a good knowledge and understanding of the properties of various irrigation solutions, appropriate irrigation methods and knowledge of various microorganisms that use in the process of root canal infection which contributes to the effectiveness of irrigation solutions. In addition, the effectiveness of the irrigating agent depends on the amount of irrigation solution, the diameter of the root canal, and the condition of the pulp.⁴

Infections that occur in the root canal are caused by microorganisms that gain access to the pulp tissue and periapical. In the case of failure of endodontic treatment, *Enterococcus faecalis* (*E. faecalis*) is one of the most bacteria found in root canals. *E. faecalis* found up to 77% of endodontic treatment failure cases. These bacteria are difficult to remove even though chemo mechanical instrumentation and root canal medication have been performed. Clinical features due to the virulence of this bacterium are acute apical periodontitis, chronic periodontitis, exacerbation of apical periodontitis, marginal periodontitis and periradicular abscess.⁵

Materials that can be used as root canal irrigation solutions are sodium hypochlorite solution, chelator solution or ethylene diamine

tetraacetic acid (EDTA), mixture of tetracycline, anacid and a detergent (MTAD), chlorhexidine, and potassium iodide iodine (IPI). Irrigation materials that are commonly used are those that have antiseptic properties and materials that can inhibit the growth of microorganisms in vitro and in vivo in living tissue.^{6,7}

Chlorhexidine is one of the solutions used as root canal irrigation. Chlorhexidine has been used in various concentrations of 0.1-2%. Chlorhexidine 2% is recommended as a root canal irrigant because non-toxic, reduces and eliminates microorganisms from the root canal. Chlorhexidine is used as a disinfectant because it has good antimicrobial properties against gram-positive, gram-negative bacteria, bacterial spores, lipophilic viruses, fungi and dermatophytes. Chlorhexidine 0.1%-0.2% is an antiseptic that is generally used to control oral plaque. Chlorhexidine cannot be used as a sole irrigation solution in root canal treatment because it does not have the ability to dissolve necrotic tissue.⁷

In Indonesia, there are various types of plants that can be used as medicinal plants, one of which is the gambier plant (*Uncaria gambir* Roxb). Gambier (*Uncaria gambir* Roxb) comes from Sumatra and Kalimantan. Gambier is a plant with a height of 1-3 cm.⁸ Gambier has been used as a complement to chewed betel and is believed to strengthen teeth. The main content of Gambier extract is about 7-33% catechins, a polyphenolic compound that has the potential as an antioxidant and antibacterial.⁹

Based on several studies on gambir, Hafsa (2016) researched the benefit of antibacterial gambir and obtained the results that Gambier extract had antibacterial activity against *Enterococcus faecalis* bacteria with a minimal inhibitory concentration of 1%.¹⁰ A similar study conducted by Merta (2013) resulted in the concentration of the inhibitory capacity of gambir extract being 80-90% effective against the growth of *Staphylococcus aureus*.¹¹ Krisnawati's researched (2009) stated that the combination of concentration and

contact time affects the antibacterial effect of gambier extract.¹²

MATERIALS AND METHODS

The type of research is experimental laboratory research. This research was conducted at the Bandung Institute of Technology Laboratory. Bacteria *Enterococcus faecalis* ATCC 29212 microbiological samples in all experimental stages have been cultured. Extract of gambier (*Uncaria gambir* Roxb) with concentrations of 1%, 1.5%, 2%, 2.5%, and 3% and 2% chlorhexidine solution. Each study group used 6 samples, therefore for the 3 groups required 18 samples.

Gambier extract was made using maceration and rotavapor methods.¹³ Gambier weighed as much as 500 g, then the gambier put into a round bottom flask and 1 L of ethanol was added, after that it stored for 48 hours. During storage, stir 2 times in 1 day.¹⁴

The macerated gambier was filtered and then evaporated at a temperature of 60 C for $\pm$ 1 hour until a thick extract was obtained. After that, let it free for 2 hours so that the extract dries. The gambier extract was weighed using an analytical balance, each weighing 0.1 g, 0.15 g, 0.2 g, 0.25 g, 0.3 g, which was obtained from previous studies.^{15,16,17}

The gambier extract dissolved with 2 ml of 10% DMSO solution to obtain a concentration of 1%, 1.5%, 2%, 2.5%, 3%. After that, the concentration of gambier extract was put into a vial bottle and labeled according to its concentration.

BHIB media (37 gr/1 liter or 3.7gr/100ml) in a closed tube was sterilized by autoclaving at 121 C for 15 minutes. Then pure bacteria *Enterococcus faecalis* which in the reaction tube was inserted into the BHIB media using a round loop. Then incubated at 37°C for 24 hours. After that, the bacteria were put back into sodium agar in a petri dish using a round loop with three quadrants etched and then incubated at 37°C for 24 hours to see if any bacterial colonies were formed.

Eighteen petri dishes containing Mueller Hinton Agar (MHA) media were prepared. A cotton swab was dipped into a reaction tube which containing *Enterococcus faecalis* bacteria. The cotton swab was scratched on the surface so that the MHA medium was in a petri dish and spread evenly. The next step, the paper disc was placed on a filled petri dish with MHA agar and incubated for each concentration of gambier extract and 2% chlorhexidine using a micropipette. Replication was made three times.¹⁵

Petri dishes were incubated at 37°C for 1x24 hours and after 24 hours the zone of inhibition was measured using a caliper.

RESULTS

The results of the research on the measurement of the inhibition zone can be seen in the figure and table as follows:

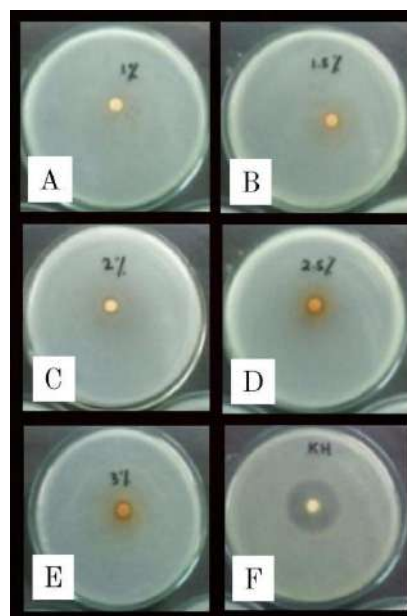
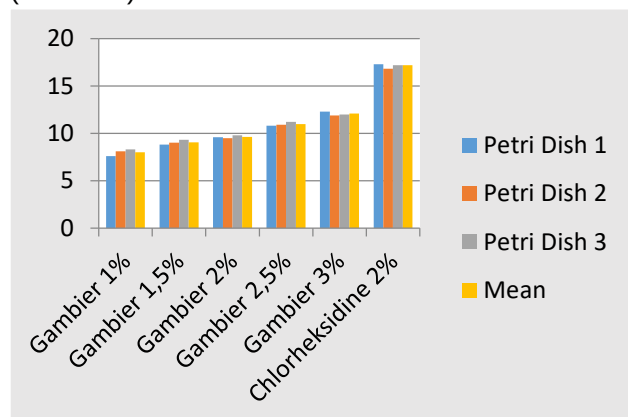


Fig 1. Comparison test results of gambier extract (*Uncaria gambir* Roxb) and 2% chlorhexidine against *Enterococcus faecalis* bacteria after incubation for 24 hours at 37 C. (A) 1% gambier extract (B) 1.5% gambier extract (C) gambier extract 2 % (D) 2.5% gambier extract (E) 3% gambier extract (F) 2% chlorhexidine.

In Figure 1 gambier extract (*Uncaria gambir* Roxb) and 2% chlorhexidine affect the growth inhibition of *Enterococcus*

faecalis bacteria which can be seen in the clear zone around the paper disc in each petri dish.

Chart 1. Measurement Results Inhibition Mean (milimeter)



Based on chart 1, it can be seen that the average diameter of the inhibition zone formed around the paper disc extract of gambier (*Uncaria gambir* Roxb) concentration of 3% is the largest value compared to the inhibition zone formed at concentrations of 1%, 1.5%, 2%, 2.5%, while chlorhexidine 2% showed the largest inhibition zone, this can be seen from the average inhibition zone formed of 17.20 mm.

Data normality test uses Shapiro-Wilk because the research sample is less than 50 data. Data normality test determines whether the data collected from 18 samples is normally distributed or not, the data distribution is said normal if $p > 0.05$. The results of normality test antibacterial comparison of gambier extract (*Uncaria gambir* Roxb) and 2% chlorhexidine against *Enterococcus faecalis* bacteria showed that all samples studied had Sig. values > 0.05 ($p > 0.05$) then the data distribution is normal, continued to test variance.

The results of Anova test shows there is a significant difference in antibacterial power from the results of the inhibition zone measurements of various concentrations of gambier extract (*Uncaria gambir* Roxb) with 2% chlorhexidine against *Enterococcus faecalis* bacteria. This is showed by the value of Sig. 0.000 ($p < 0.05$). One Way Anova test can only show whether or not there is a difference in antibacterial power between gambier extract (*Uncaria gambir* Roxb) and 2% chlorhexidine

against *Enterococcus faecalis* bacteria. For this reason, it is necessary to test using the Multiple Comparison LSD (Least Significant Difference) test in order to know how big the difference in the antibacterial power of each group.

The results of Multiple Comparison (LSD) test show there is a significant difference in the average comparison of the inhibition zones between one group and another. This is showed by the value of $p < 0.05$ in all comparisons between various concentrations of gambier extract (*Uncaria gambir* Roxb) and 2% chlorhexidine.

DISCUSSION

Enterococcus faecalis has been known as a bacterium that can survive in endodontic treatment. The frequency of the presence of *E. faecalis* in cases of post-endodontic infection was found to be nine times higher than that of primary endodontic infections.^{3,4,5}

The ability of a bacterium to survive against medicine can be known by looking at the decreasing colonies of a bacterium and the concentration of medicine liquid is one of the factors that affect the effectiveness of the medicine in killing *E. faecalis*.^{18,19}

The results are each concentration of gambier extract there was an inhibition zone against *E. faecalis* bacteria. In the 2% chlorhexidine test,²⁰ the inhibition zone against the bacteria *E. faecalis* formed had a larger size than the inhibition zone in the gambier extract. The size of the inhibition zone in 2% chlorhexidine on average is 17.20 mm, while the gambier extract with a concentration of 1% has an inhibition zone of 8.00 mm, a concentration of 1.5% with an inhibition zone of 9.03 mm, a concentration of 2% with an inhibition zone of 9.63 mm, a concentration of 2.5% with an inhibition zone of 10.97 mm and a concentration of 3% having an inhibition zone of 12.07 mm.

The inhibition zone formed after an incubation period of 24 hours indicates that the bacteria in the area cannot grow due to the influence of the test material, which is gambier

extract.²¹ In this study, it shown that the concentration of gambier extract which increased from 1%, 1.5%, 2%, 2.5% and 3% to *E. faecalis* bacteria for 24 hours showed a significant increase in the inhibition zone ($p < 0.05$) much bigger the concentration of the gambier extract solution, much bigger the inhibition zone formed. This research is in line with the research by Hafisah et al. showed that the concentration of 1% gambier extract with a contact time of 24 hours against *Enterococcus faecalis* bacteria effectively inhibited the growth of *Enterococcus faecalis* bacteria.¹⁰

Research by Istiyaningsih (2012), also used gambier extract (UncariagambirRoxb) against root canal microbes in necrotic teeth with various concentrations, found that gambier extract was also effective in inhibiting the growth of *Streptococcus mutans* bacteria.²²

Research by Kresnawaty and Zainuddin (2009) stated that methyl derivatives of ethanol extract of gambier leaves has antioxidant and antibacterial activity.^{12,18}

Chlorhexidine is an irrigation solution that has been proven effective against *Enterococcus faecalis* bacteria. Darmetto et al (2005) assessed that the antimicrobial power of 2% chlorhexidine against *E. faecalis* bacteria was more effective than NaOCl, because 2% chlorhexidine is effective as a root canal disinfection agent because its antibacterial capacity can destroy the integrity of bacterial cell membranes, which is changes in cytoplasmic membrane permeability can increase cytoplasmic protein deposition, change cellular osmotic balance, interfere with metabolism, growth and division of bacterial cells, so that *Enterococcus faecalis* cell walls can be damaged, lysed and eventually die.^{19,23}

Based on the results of the research, it was found that gambier extract (UncariagambirRoxb) and 2% chlorhexidine had antibacterial ability in inhibiting the growth of *Enterococcus faecalis* ATCC 29212 bacteria. Gambier extract with the smallest concentration of 1% still could inhibit the growth of *Enterococcus faecalis* ATCC 29212 bacteria.

This is indicated by the presence of an inhibition zone formed. Thus gambier extract can inhibit the growth of *Enterococcus faecalis* ATCC 29212 bacteria, but 2% chlorhexidine has greater antibacterial power.²⁰

CONCLUSION

There is a difference in the antibacterial of gambier extract (UncariagambirRoxb) and 2% chlorhexidine against *Enterococcus faecalis* bacteria. Chlorhexidine 2% has a greater zone of inhibition against *Enterococcus faecalis* bacteria than gambier extract (UncariagambirRoxb).

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Correlation Between Parents Level of Education and Dental and Oral Hygiene in Children with Autism at Mutiara Hati Special School

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ABSTRACT

Background: Children with autism have difficulty controlling the movement of tongue that food often cannot perfectly swallowed. Parents play a very important role in maintaining dental and oral hygiene for children with autism. The behavior of children with autism is strongly influenced by the parent's level of education. **Objective:** to determine the correlation between parent's level of education and the level of oral hygiene in children with autism (measured by OHI-S). **Methods:** This type of research is analytic observational, with a cross sectional approach. Simple random sampling technique was performed. The total sample was 23 students of Mutiara Hati Surabaya Autism Special School. OH Index form by WHO was used to collect the data of dental hygiene and a questionnaire form by RISKESDAS was used to collect data of parent's level of education. **Results:** There is a significant correlation between the parent's level of education and OHI-S in children with autism (<0.05), $R = -0.49$ means the correlation is sufficient. The lower the level of dental and oral hygiene the higher the level of education of their parents. **Conclusion:** There is a correlation between the parent's level of education and dental and oral hygiene in children with autism at Mutiara Hati Special School.

Keywords: Autism, parental education level, OHI-S, oral hygiene.

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INTRODUCTION



Autism is a very severe and complex neurobiological developmental disorder, including disturbances in aspects of social interaction, communication, language, behavior, emotional disturbances and sensory perception and even motor aspects. They are unable to form social correlations because of difficulties in communicating normally, even avoiding or not responding to social contacts.^{1,2}

The prevalence of autism in the world currently reaches 15-20 cases per 10,000 children or 0.15-0.20%, if the birth rate in Indonesia is six million per year, the number of people with autism in Indonesia will increase by 0.15% or 6,900 children per year. The prevalence of boys with autism in the world is three to four times greater than girls. In Indonesia itself, boys with autism are five times greater than girls.^{2,3}

The cause of autism itself is still unknown until this day. Based on research, intermediate compounds as metabolites, which are generally in the form of organic acids, if present in excessive amounts can interfere with brain function, and are thought to be the cause of autism symptoms. This situation is often preceded by digestive disorders which are considered the main cause of metabolic irregularities.³

Children with autism symptoms have various limitations such as not being able to clean their own oral cavity, thereby increasing the risk factor for damage to the teeth and surrounding soft tissues^{4,5}. Dental and oral health in children is an important factor that must be considered as early as possible, because tooth decay can occur at the age of children and can affect the growth of teeth at a later age.

Mutiara Hati itself is a school that accommodate children with special needs. Based on a preliminary study conducted by researchers in September 2018, there has been no research on the status of oral hygiene in children with autism at Mutiara Hati Special School in Sidoarjo. For this reason, researchers want to conduct further research to determine

the correlation between the level of parental education and the oral hygiene of their children.

In children, the influence of parents is very strong. Parents, especially mothers, have a very important role in the attitudes and behavior of children in the maintenance of their teeth. Parents act as the closest people to children who always educate, train and give love to children. Knowledge, attitudes, and behavior of all these components affect the dental and oral health status in children.^{5,6}

Parents and teachers must be equipped with training in educating and teaching children to be concerned about dental and oral health and general body health.⁵ Dental and oral health needs to be improved throughout the family and community in order to support dental and oral health status.^{7,8} Individuals with special needs have lower levels of dental and oral health and hygiene compared to normal individuals.^{9,10} In children with autism, poor muscle tone, poor coordination, continuous drooling, hyperactive knee movements, often accompanied by strabismus, and 30% have epilepsy.^{11,12}

Children with autism have coordination of irregular tongue movements, food is often held and not swallowed immediately. This habit is coupled with the consumption of sweet foods, and if not cleaned optimally can cause an increase in tooth decay into cavities and dental caries in autistic children.^{13,14} In order to change the behavior of individuals or communities, it is necessary to understand the factors that influence changes the behavior. Factors that influence dental disease are knowledge factors, education factors, nutritional factors, lifestyle, socio-economic, age factors, environmental factors, cultural factors, dental and oral health service system factors, habit factors, and improper tooth brushing factors.^{15,16} Higher education has a positive effect on health and promotes healthy behavior.¹⁷

In general, to measure dental and oral hygiene an index is used. The index is a number that indicates the clinical condition obtained at the time of the examination, by measuring the area of the tooth surface covered by debris or



calculus called OHI-S (Oral Hygiene Index Simplified) from Green and Vermillion 1964.¹⁴ Status of oral hygiene (OHI-S) is the sum of debris index (DI) and calculus index (CI) by looking at the scores on 6 permanent teeth as index teeth. The OHI-S index is useful for seeing whether oral hygiene is in the good, moderate, or poor category.¹⁵

Therefore, the purpose of this study was to determine the level of parental education on the level of dental and oral hygiene of children with autism at Mutiara Hati Special School.

MATERIALS AND METHODS

This research is classified as an observational analytic research with a cross sectional research design which used probability sampling data collection by simple random sampling. Simple Random Sampling is a sampling method in which each member of the population is given the same opportunity to be selected as a sample²², where the sample used is 23 children in the range of 6-17 years old. The subjects give their consent before collecting data. In this study the parents treated to fill out a questionnaire and children with autism who were examined for OHI-S. The variables in this study used independent and dependent variables. The independent variable is the level of education, while the dependent variable is the level of dental and oral hygiene. The place where this research was conducted is SLB Mutiara Hati Sidoarjo. The implementation time of this research is from April to August 2019.

Researchers used a questionnaire in collecting data. The questionnaire contains the name, age, gender, parental education and questions related to dental and oral health as many as 14 questions. In a validity test the sample were showing a valid result, also in a reliability test showed a normal result for all the subjects. Subjects were given time to fill out the questionnaire. Each correct answer was given a score of 3, less precise was given a score of 2, and incorrect answers were given a score of 1.

OHI-S (simplified oral hygiene index) is an index to measure the area of the tooth surface covered by debris and calculus. This index is easy to use because of the objective criteria, the examination can be done quickly, it can assess the degree of oral hygiene individually to the smallest extent.¹⁴

To determine the debris assessment criteria or OHI-S assessment, the debris score and calculus score tables are used.¹⁵

The examination was done by the researcher and carried out using a mouth mirror and an excavator, by scraping the excavator on the tooth surface. In the Oral Hygiene Index, scoring for each tooth is done as follows :

- 0 : On the visible tooth surface, there is no debris/calculus
- 1 : On visible tooth surface, on soft debris/calculus covering 1/3 of the tooth surface or less than 1/3 of the surface.
- 2 : On the tooth surface visible soft debris/calculus covering the surface of more than 1/3 of the tooth surface, but less than 2/3 of the tooth surface.
- 3 : On the visible surface of the tooth there is debris/calculus covering the surface of more than 2/3 of the surface or the entire tooth surface.

OHI-S can be measured by the formula:

$$\text{OHI-S} = \text{Debris Index (DI)} + \text{Calculus Index (KI)}$$

OHI-S Assessment Criteria :

- Good : If the value is between 0.0-1.2
 - Moderate : If the value is between 1.3-3.0
 - Poor : If the value is between 3.1-6.0
- (Green and Vermillion scores, 1964)

After getting the required data, the next step is data analysis. This research is an observational analytic study with a cross sectional approach because the research is conducted by observing data once at a time, which is carried out on the dependent variable and the independent variable. The data scale used for OHI-S children with autism and the level of education of parents is ordinal. Analysis of



differences in education level of OHI-S children with autism using Friedman test.^{16,17}

Knowledge measurement can be done by interviews or questionnaires that ask the content of the material to be measured from the research subject or respondent. Meanwhile, according to Ramadhan dkk (2016), the quality of knowledge can be done by scoring:

The level of knowledge is good if graduated from high school or above.

The level of knowledge is quite good if graduated from junior high school or in high school.

The level of knowledge is not good if graduated from elementary school or not going to school.

RESULTS

Characteristics of Research Respondents.

Based on research conducted in April-August 2019 on research subjects a total of 23 respondents obtained characteristic data, including: the age of the respondent, the last education of the respondent's parents, which can be seen in the following statements:

Respondent Age

This study was guided by the results of the examination and school data of the Mutiara Hati SLB students as many as 23 respondents with an age range of 6 - 17. Most of the respondent is 6 years old (26%) and 9 years old (22%). Characteristics of Respondents by Age.

Respondent's Parents Education

Characteristics of Respondents Based on Parents' Last Education. When both or one of the parent's last education is in a bachelor degree, they're categorized as "High Education" level. When one of the parent's highest education was in middle to high school, they are categorized as "Intermediate Education" level. Then, when one of the parent's highest education was in elementary school, they're categorized as "Low Education" level (UU SISDIKNAS No. 20 Th. 2003).

The highest education level of parents was in intermediate education (15 parents), then high education (6 parents), and low education (2 parents).

Data Debris Index (DI) and Calculus Index (CI)

Table 1. Debris Index (DI) and Calculus Index (CI)

	N	Mean	Std. Deviation
DI	23	0.9826	0.47449
CI	23	0.4391	0.21477
OHI	23	1.3826	0.53907
Valid N (listwise)	23		

Based on Table, it is known that the respondent's debris index (0.9826) is higher than the respondent's calculus index (0.4391). The average oral hygiene index score of the respondents is 1.3826 which means the oral hygiene status is moderate.

Cross Tabulation Analysis Results

Parents' Education Level and Debris Index (DI)

Table 2. Cross tabulation analysis between parents' education level and Debris Index (DI)

Correlations			DI	Education Level
Spearman's rho	DI	Correlation Coefficient		-0.575**
	Education Level	Correlation Coefficient	0.575**	
	Sig. (2-tailed) = 0.004			

** . Correlation is significant at the 0.01 level (2-tailed).

Based on Table, it is known that the value of sig = 0.004 < 0.05 means that there is a significant correlation between the level of Parental Education and the Debris Index (DI). The correlation value -0.575 means that there is a strong and negative correlation. A negative correlation means that the lower the DI, the higher the level of education.

Education Level and Calculus Index (CI)

Table 3. Cross tabulation analysis between parents' education level and Calculus Index (CI)

Based on Table, it is known that the value of sig = 0.044 < 0.05 means that there is a significant correlation between the level of parental education and the Calculus Index (CI). The correlation value -0.431 means that the correlation between the level of parental education and the Calculus Index (CI) is sufficient and negative. A negative correlation means that the lower the CI, the higher the level of education.

Education Level and OHI-S

Table 4. Cross-tabulation analysis between parents' education level and OHI-S

Correlations			Education Level	OHI
Spearman's rho	Education Level	Correlation Coefficient		-0.490*
	OHI	Correlation Coefficient	-0.490*	
	Sig. (2-tailed) = 0.018			
*. Correlation is significant at the 0.05 level (2-tailed).				

Based on Table, it is known that the value of sig = 0.018 < 0.05 means that there is a significant correlation between the level of Parental Education and OHI-S. The correlation value -0.490 means that the correlation between the level of Parental Education and OHI-S is sufficient and negative. A negative correlation means that the lower the OHI, the higher the level of education.

DISCUSSION

Correlations			Education Level	CI
Spearman's rho	Education Level	Correlation Coefficient		-0.431*
	CI	Correlation Coefficient	-0.431*	
	Sig. (2-tailed) = 0.044			
*. Correlation is significant at the 0.05 level (2-tailed).				

This study aims to determine the level of parental education on the level of dental and oral hygiene of children with autism at Mutiara Hati Special School. This study was aimed at parents of children with autism because the level of parental education has a significant influence on the level of dental and oral hygiene, especially in children with autism who cannot maintain their own oral hygiene. 18 Respondents in this study were students with autism in Mutiara Hati SLB Surabaya with a total sample of 23 students. The sample was selected by simple random sampling. Based on the results of this study indicate that the age of the respondents ranged from 6-17 years, while the age of the most respondents was 6 years with 6 children (26%).

Educational data for parents of autistic students were obtained from questions through a questionnaire, while autistic students were examined for oral hygiene based on OHI-S status. Based on the results of the study, it is known that the parents of the research respondents with the highest education level are secondary education with 15 children (65%), then 6 children with high education (26%), and 2 children with low education (9%). OHI-S status in autistic children is divided into three categories, namely good, moderate and bad categories. Based on the results of the study, it is known that most of the respondents' dental and oral hygiene levels have moderate criteria with a total of 13 children (57%), while good criteria are 9 children (39%), and the least is bad criteria with 1 child (4%).

The results showed that there was a significant correlation between the level of parental education and the Debris Index (DI), the lower the DI the higher the education level. There is a significant correlation between parents' education level and Calculus Index (KI). the lower the KI the higher the level of education. In addition, there is a significant correlation between the level of Parental Education and OHI-S, the lower the OHI the higher the education level. The alignment between the majority of respondents and their parents with secondary education and with moderate OHI-S

criteria is in accordance with the results of Christiano and Rama (2015)¹⁹ which states that the higher the level of education, the easier it is to absorb new information and innovations, including dental health. Research conducted by Afiati (2017) also proves that when a person is at a higher level of knowledge, the attention to dental health will be higher, and vice versa, when someone has less knowledge, attention and dental care are also low.²⁰ Opinions The same thing was also conveyed by Nuntung, et al (2015), which stated that the higher a person's level of formal education, the better knowledge and attitudes of healthy living behavior, the easier it is to get a job so that more income is obtained to meet health needs. On the other hand, a lack of education will hinder the development of one's attitude towards newly recognized values.²¹

The educational level of parents can influence child and family health related behaviours. Studies have shown that the education level of mothers is likely to have a greater impact than that of fathers. An association has been found between higher parental education level and increased likelihood of consuming a healthy diet^{22,23}. The results of this study are in line with the research of Rianto (2015) which states that parental knowledge is very important in underlying the formation of behaviors that support or do not support children's dental and oral hygiene. This knowledge can be obtained naturally or in a planned manner, namely through the educational process. This study also agrees with research in Purnomo (2015), Afiati dkk (2017) dan Ngantung (2015) where there is a correlation between parental characteristics (education level, income level and knowledge) with dental caries experience in children.^{15,19,20}

CONCLUSION

There is a significant correlation between the level of parental education and the level of dental and oral hygiene of autistic children at Mutiara Hati Special School, the lower the level

of dental and oral hygiene of autistic children, the higher the level of parental education.

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Periodontal Splinting Choises For Patient With Edentulous

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ABSTRACT

Background: Mobile tooth is a problem that often occurs and result in tooth loss. It caused by disease or periodontal tissue's injury. Splint is a device that is made to stabilize or tighten mobile tooth due to a trauma or disease. It works by distribute the occlusion pressure to reduce tooth mobility. Removable partial denture frame is one treatment for missing teeth and permanent splints. **Objective:** The aim of this treatment is to explained effect of periodontal splints for edentulous patient. **Case:** First case: A woman complained mobile teeth on the incisors. Intraoral examination showed remaining teeth couldn't be abutment. Second case: A woman complained mobile teeth on the incisors. Intraoral examination showed remaining teeth could be abutment. **Case management:** First case: Patient was given initial therapy and continued with rehabilitative therapy by removable partial denture metal frame. Second case: Patient was given initial therapy splinting using fiber reinforced composite. A week post treatment patient felt comfortable. **Conclusion:** It can be concluded periodontal splinting reduced teeth mobility and prevent further damage to the periodontal tissue og Edentulous patient.

Keywords: Removable partial denture, splinting, frame

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INTRODUCTION

Periodontitis is inflammation of periodontal tissues characterized by the formation of pockets and resorption of alveolar bone. Periodontitis can cause teeth to loosen and fall out of their socket. The initial teeth treatment for periodontitis with mobility is splinting. Splinting is a treatment that aims to stabilize or reduce the degree of tooth mobility, while a splint is a tool or material that serves to stabilize and tighten loose teeth¹. Splinting is indicated for mobile teeth and caused discomfort to the patient². Periodontal splint works by dividing the occlusal pressure across the teeth's surfaces to prevent further damage of the mobile teeth. Periodontal splint is used when the adaptive capacity of the periodontium has been exceeded and the degree of mobile teeth is incompatible with masticatory function³.

The important thing to do for splinting is selecting an abutment tooth. While selecting an abutment tooth for splinting one should always consider the pericemental area of an abutment tooth. Ante postulated that "The total periodontal membrane area of the abutment teeth must equal or exceed that of the teeth to be replaced." Patient with edentulous area should give special attention when determining the type of periodontal splint. When ante postulated law is not fulfilled, it can cause an increase in periodontal tissue damage⁴.

Type of periodontal splints are classified according to time and shape. The type of splint according to time is a temporary splint and permanent splint, while based on its shape it can be a removable splint or a fixed splint⁵. Temporary splint can be used with composite. The use of composite as base materials began to be developed to increase splinting strength which is currently widely known as Fiber Reinforced Composite (FRC), a fiber that is easy to manipulate, aesthetically pleasing and can be embedded in a resin structure⁶. One type of permanent splint is a removable partial denture metal frame⁴.

Removable partial dentures are denture that aim to replace part of the missing natural teeth and can be removed and installed by the

wearer themselves³. The purpose of denture is to restore stomatognathic functions, masticatory, phonetic, aesthetic functions and maintain the condition of the remaining tissues. Denture helps to regulate functional forces to be evenly distributed so as to minimize stresses that could potentially damage the periodontal tissues on other teeth⁵.

Removable partial denture can function as periodontal splint when the condition of the periodontal tissues in the remaining teeth is not good². Removable denture partial metal frame is ideal periodontal splint compared to acrylic denture. Removable partial denture metal frame can be made narrower, thinner and stronger, and stiffer to achieve the ideal design⁴. The objective of this treatment is to explain the effect of periodontal splints for edentulous patient.

CASES

Case 1:

A 46-years-old female patient came to dental hospital loose front teeth and only a few remaining teeth. The patient complained of difficulty speaking and eating. The patient wanted treatment for the loose teeth. The patient's tooth was extracted 6 months ago. The medical history of the patient revealed that the patient was in good health with no history of any systemic disease and or condition. She had no known drug allergy and was not taking any medication. The results of the general condition of the patient, BP: 127/68 mmHg, pulse: 69x/minutes, RR: 18x/minutes. Extraoral examination: face is symmetric, there is no swelling of lymph nodes and palpation (-). Intraoral examination: edentulous area 16, 15, 14, 13, 23, 24, 25, 26, 37, 36, 34, 44, 45, 46.

Case 2:

A 42-years-old female patient came with loose front teeth since 2 years ago and felt uncomfortable. Intraoral examination revealed reddish-colored gingiva on teeth 13, 12, 11, 22, 23, 25, 27, 28, 34, 33, 32, 31, 41, 42, 44, 45, 47. Unstippling gingival texture on teeth 17, 14, 12,

25, 27, 33, 32, 31, 41, 42, 43. Consistency: firm. Gingival recession was found in teeth 14 (3 mm), 13 (4 mm), 11 (2 mm), 23 (4 mm), 25 (4 mm), 35 (3 mm), 34 (3 mm), 33 (3 mm). mm), 32 (3 mm), 31 (3 mm), 41 (3 mm), 42 (3 mm), 43 (3 mm), 44 (3 mm), 45 (3 mm). Mobility of teeth 31 and 32 degrees 1), teeth 41 and 42 (degrees 2).

Edentulous area on 36 and 46. The results of the examination showed that the patient's diagnosis was chronic periodontitis of teeth 31, 32, 41, 42. The posterior teeth were still sufficient and adequate to be used as abutments, so the treatment plan for the patient was a periodontal splint using fiber.



Figure 1. Intraoral examination

CASES MANAGEMENT

Case 1:

Initial treatment, patient was given scaling, root planing, moulding maxilla and mandibula (figure 1).

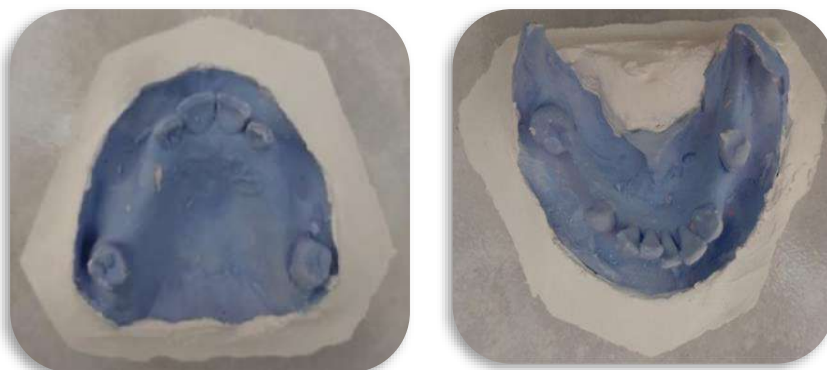


Figure 2. Moulding with mucostatic technique

On the next visit, tried in individual tray and made Border Molding. The patient was

instructed to come and then tried in border molding, preparation of occlusal rest and

changed of amalgam filling to composite. Patient treatment was continued with mucocompression molding to imprint the muscles and areas that

would support removable denture retention and stability (Figure 2).

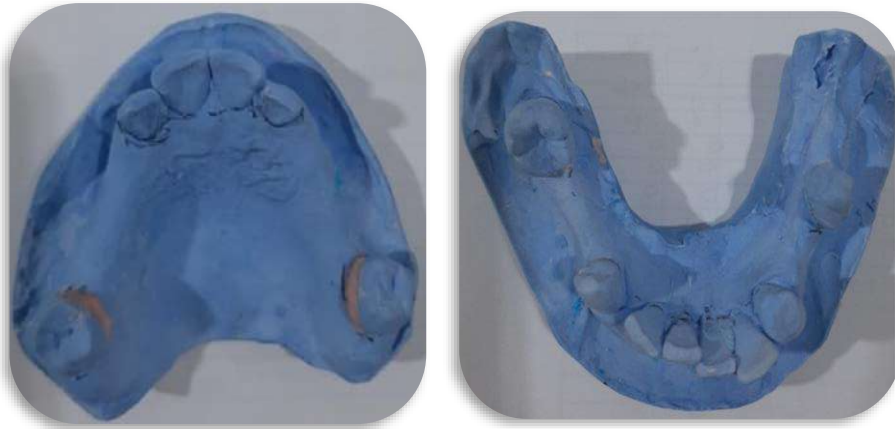


Figure 3. Mucocompression molding

On the fifth visit (Figure 3) the patient came for try in the metal frame which was tested on the patient directly by evaluating the retention, stabilization and distribution of occlusal forces on the loose teeth. The patient was instructed to come the following week

(Figure 4) for try in the baseplate and biterim and doing Maxillomandibulo Relationship (MMR). The patient's next visit was carried out try-in dental elements (Figure 5). After the results of the try-in match the working model, it can be entered into the dental laboratory for processing



Figure 4. Try in frame



Figure 5. Try in base plate and bite rim



Figure 6. Try in dental elements

The last visit took the finished denture and inserted it into the patient (Figure 6) and was given instructions regarding the use and care of the denture. The patient was instructed one week later to be evaluated on removable partial

denture. The results of the evaluation, the patient feel more comfortable when eating and talking because the teeth do not feel loose anymore.



Figure 7. Metal frame removable partial denture insertion

Case 2:

On the first-time round, a full-mouth scaling and root planning were performed a week later as well as polishing of all the rough dental surfaces and was followed by occlusal adjustment. The splint installation procedure was started by measuring the fiber length as needed in the dental model from teeth 34 to 44 using dental floss, then prophylaxis was carried out. All labial and lingual surfaces were cleaned with a pumice and a low speed hand-piece. Fiber is taken using tweezers and then the fiber is cut according to the required amount. Fiber should

be kept out of light by placing it under a cover during preparation. Fiber is placed on a glass plate. The lingual part of teeth to be splinted was applied with 37% etching for 10 seconds, then rinsed dry and then isolated with a cotton roll. Bonding was applied with a microbrush, gently air-dried and curing for 20 seconds. Fiber in a closed container is applied composite with the help of a plastic filling instrument. Flowable composite resin is applied in a thin layer on the lingual of the tooth to be treated. A tooth-adjusted FRC is applied and gently pressed against each tooth. Make sure the fiber is not in

the occlusion area. The fibers were pressed into the interproximal space, then curing for 5 seconds on each tooth. Then the entire fiber splint was covered with a thin layer of composite (0.5 mm). Then curing for 40 seconds. Fiber should not be cut when finishing/polishing the splint. Excess resin is removed with a composite finishing bur. Polishing was carried out using a hand-piece at a speed of 3000 rpm. Fiber should not be exposed. Check for occlusion by

instructing the patient to do biting and chewing movements. The patient is asked whether there is a lump or discomfort. Then the patient was given education not to eat hard food first, not to play with fiber splints with the tongue, always maintain dental and oral hygiene by brushing teeth 2 times a day in the morning and at night before going to bed, brushing between teeth with an interdental brush, using a toothbrush with soft bristles, and came back for control after 7 days.



Figure 12. Extracoronal periodontal splinting using FRC

DISCUSSION

Loose teeth are a common problem in the oral cavity and can cause teeth to fall out of their sockets or avulsion. This condition can occur due to injury or disease of the periodontal tissues. Loose teeth can be physiological or pathological problems. Increased mobility of teeth can be caused by many factors, the most common factor causing loose teeth is inflammation caused by plaque accumulation and trauma from occlusion. Loose teeth is one of the clinical signs of periodontitis that occurs due to damage to the bone that supports the teeth, the expansion of inflammation from the gingiva to the deeper supporting tissues and the pathological process of the jaw that often occurs in chronic periodontitis patients accompanied by occlusion trauma, so that the reduction in the degree of tooth mobility is one of the causes of tooth loss, one of the main goals of periodontal therapy^{6,7}. The degree of tooth mobility

according to Miller is divided into 3, namely 1) Grade I: Slightly more than usual; 2) Grade II: loose teeth <1 mm; 3) Grade III: Loose teeth >1 mm horizontally with movement in a vertical direction.

The occurrence of loose teeth is divided into two stages, the initial stage is the intra-socket stage, namely the socket where the tooth is moving within the boundaries of the periodontal ligament. In the early stages of tooth movement about 0.05 to 0.10 mm due to a force of about 100 lb. The second stage is gradual and is associated with the elastic deformity of the alveolar bone in response to increased horizontal pressure. Treatment of loose teeth due to periodontitis is carried out in stages. These stages are the initial, surgical, rehabilitative, and maintenance stage. Splinting is an initial stage, in addition to splinting at this stage, occlusion adjustments are also made to eliminate any occlusive trauma that can interfere with treatment. Splinting plays a role in fixation

of teeth so that the degree of tooth mobility is reduced and will gradually be followed by periodontal tissue repair.

There are various kinds of splints based on purpose, duration of use, and location. Ferencz classified splints into short-term splints, temporary splints, and long-term splints according to the necessity. Short-term splints are splints used for less than 6 months during periodontal treatment and may change for other types of splints². A temporary splint is a splint that may be used from several months to years for diagnostic purposes, and usually leads to a more permanent type of stabilization. Permanent splints are worn indefinitely and can be repaired or removed. Splints are intended to increase functional stability and improve aesthetics in a long-term. This splint is usually placed only after completion of periodontal therapy and achievement of occlusal stability. Examples include Pin ledge type of abutment, clasped supported partial denture or better-known metal frame partial denture as in case⁸.

In the first case, the treatment option taken to address the patient's main complaint was to make a removable partial denture with a metal frame. Making metal frame splinting aims to reduce lateral forces, masticatory force distribution throughout the teeth evenly. Adjustment of the occlusion prior to splint placement aims to eliminate premature contact and occlusal trauma, both primary and secondary, and to improve the condition of the temporomandibular joint. If the periodontal tissue is unable to withstand functional stresses, the teeth will be loose, this can interfere with function, especially in cases such as the patient above who has lost a lot of teeth⁴.

For conventional splinting periodontal, joining teeth together in a splint system is an important method used to decrease mobility in cases of reduced periodontal support. Several biomechanical studies investigated the influence of bone levels and splinting on teeth with reduced periodontal support height. The reduced bone support and unfavorable crown to root ratio of an abutment will reduce the area of

the periodontal ligament and also increase the leverage when a non axial load is applied. Removable metal frame partial denture showed an improvement in stress distribution to the supporting structures¹⁰. A review of removable partial denture as periodontal therapy pointed out that a tooth that has lost more than 50% of its bone support is indicates for removable partial denture for periodontal splinting¹¹.

In the second case, splinting treatment with FRC material was carried out because the patient's teeth were crowded so that the FRC could be attached to the tooth surface, besides that there were still teeth that could be used as abutments. The various FRC thicknesses can be adjusted according to the length of the tooth to be treated. FRC is a new invention, modern, effective, high aesthetic value, provides comfort for patients and is easy to clean. Fiber with FRC material can be used for palatal or lingual splinting, labial splinting or occlusal splinting¹². The advantages of this material are that it is very easy to maintain, metal free, transparent, aesthetically pleasing, and looks natural. Fiber Reinforced Composite splint is a splinting material that combines the adhesive properties of a composite with the strength of a fiber. The combination of fiber and composite materials allows the splint to have a minimal thickness but remain strong. These two materials are chemically bonded thereby increasing the bond strength between the two materials and extending the splint's life span^{13,14}.

Fiber Reinforced Composites (FRC) also have several weaknesses, including the possibility of fracture and attrition of the occlusal part if there is excessive pressure. Delamination and secondary caries can also occur if the application of FRC to the tooth surface is carried out in an inappropriate manner. The mechanical properties of FRC can also decrease after hydrolytic aging^{15,16}. After the splint was carried out, the patient was given some information for education related to the treatment that had been given, including not eating hard food first, not playing with the fiber splint with the tongue, always maintaining oral hygiene by brushing



teeth 2 times a day in the morning and the night before going to bed, brushed between the teeth with an interdental brush, used a toothbrush with soft bristles, and came back for control 7 days later.

The important thing to note regarding loose tooth therapy is the patient's oral hygiene. Therefore, determining the design of dentures is very important so that patients can maintain oral hygiene independently at home and do not easily cause food impaction. Denture design is also important because it relates to periodontal health and its role in maintaining the stability of the remaining teeth. Determining the number of teeth that are guards is also something that must be considered so that the purpose of using dentures is achieved. Determination of the abutment teeth used is based on the ante law, i.e. the abutment teeth are at least as large as the missing teeth or loose teeth. Increasing the number of abutments can help increase the support for the periodontal tissues. In addition, it will reduce torsion and lateral pressure which has the potential to damage the periodontal tissue of the abutment teeth. In the condition that the abutment teeth have disturbances in the periodontal tissue, the use of more than one tooth can be an option as additional support⁶.

CONCLUSION

In the condition of loose teeth and many missing teeth, to restore stomatognathic function and reduce tooth mobility, periodontal splinting can be used. The choice of splinting with metal frame removable dentures can be an option when the patient has lost so many teeth that no abutment can be used. The use of periodontal splinting using FRC can be used on loose teeth with sufficient abutments.

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The Comparison of Microleakage between Bioactive Composite Resin and Compomer

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ABSTRACT

Background: The ideal restoration material should have endurance, compatible with tooth structure and visible surrounding tissues and must be able to restore the lost tissue. There are various restoration materials such as Compomer and Bioactive Composite Resin. Microleakage is one of the failure in surface sealant, and this may increase the risk of secondary caries. **Objective:** The aim of this study was to prove and compare the differences of microleakage between Compomer and Bioactive Composite Resin in class I restoration. **Methods:** Maxilla's first premolar teeth with class I cavities (diameter: 3mm, depth: 3mm) divided into two groups with 10 samples each group. Group I: Compomer (Dentsply), Group II: Bioactive Composite Resin (Activa Pulpdent USA). All group were immersed in 1% methylene blue solution for 24 hours, rinsed in running water, and section mesial-distal using carborundum disc. Afterward, section were assessed for dye penetration that represent the microleakage using scoring method under digital microscope. Finally data were collected and statistically analyzed. **Results:** There were significant differences between each group ($p < 0.05$). Microleakage in restoration with Bioactive Composite Resin (1.7) shows smaller values than Compomer restoration (4.4). **Conclusion:** This research show that there is differentiation of microleakage between Compomer and Bioactive Composite Resin. In Bioactive Composite Resin found the smallest microleakage.

Keywords: Microleakage, compomer, bioactive composite resin

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INTRODUCTION

Dental restoration materials are materials used to repair and restore the tooth structure biologically, aesthetically, and physiologically. Dental restoration materials not only have a good attachment between the restoration with the cavity walls but also have the protective properties to prevent secondary caries formation.^{1,5}

A criteria of good marginal adaptation is the absence of leakage at the border of the restoration and teeth.¹ Restoration microleakage is microscopic gaps between the cavity wall and the gaps that can be passed by microorganisms, fluids and molecules.² Microleakage can be caused by several factors, that are, shrinkage due to polymerization (polymerization shrinkage), the acidity of the oral cavity, thermal contraction, water absorption, mechanical stress.³ Restoration is succeed if the restoration material and dental tissue can be attached properly. Adhesion of restorative material to dentin strongly affected by the polymerization reaction, the more perfect the polymerization, the material will have stronger attachment to dentin.⁴ The presence of microleakage can trigger secondary caries, tooth discoloration, pulp sensitivity, and inflammation or the most extreme until the occurrence of pulp necrosis.⁵

Bioactive composite resin and the compomers are two dental restoration materials widely used nowadays and have many benefits, from the capability fluor releasing, physic value, and esthetic value.^{3,6} Researchers want to compare the microleakage of the bioactive composite resin and the compomers. This study can provide information for clinicians to be able to use restoration materials with a low risk of microleakage and to know about the differences in microleakage of bioactive composite resin and compomers. Compomer is often used to restore primary teeth, but the failure rate is high enough to 27% so that the restoration is easily detached. From this statement, author wants to look for the solution.^{5,10}

To reduce polymerization shrinkage, researchers in the field of dentistry have developed a composite resin with different matrix resin components. With the advancement of materials, a new restoration material was launched, combining bioactive ion resins with glass ionomer.⁶ The aim is to combine the aesthetic properties of the composite resin and the ability to release fluoride ions as well as the adhesion properties of the glass ionomer. Another goal of bioactive composite resin material is to minimize the occurrence of micro-fissures, especially in pits and dental fissures. Bioactive was first introduced in 1969 and is defined as a material that can obtain a specific biological response to the surface of the material, then produces a bonding structure of the tooth with that material.⁷ Bioactive composite resin has the ability to exchange more calcium, phosphate, and fluoride ions than GIC and stronger against stress. Bioactive composite resin has physical and aesthetic properties like a composite, this material can also stimulate the formation of apatite minerals and improve tooth structure to minimize the micro gap at the edge of the lift.⁶

Polyacid-modified resin-based composites or compomers were introduced as dental materials in the mid-1990s, was called compomers because it came from a combination of two materials that were "comp" from composite and "omer" from ionomer.⁸ The combination of GIC with composite resin makes the compomers have the same adhesion ability as GIC and value as restoration as resin composite.⁹ Compomers consist of Carboxylic acid-modified dimethacrylate (TCB resin), bisphenol a-dimethacrylate, urethane resin, triethylene glycol dimethacrylate (TEGDMA), and trimethylolpropane trimethacrylate (TMPTMA).¹⁰ The formula of compomers is closer to composite resin, with the addition of the essential components of GIC that releasing fluorosilicate glass particle which can release fluoride is one of the advantages of compomers compared to conventional composite resin.¹¹

MATERIALS AND METHODS

This research was classified as true experimental laboratory research, using Randomized Post Test Only Control Group Design. This study used bioactive resin composite and compomers, each group contain 10 samples. The total sample is 20.

Twenty extracted premolars for orthodontic treatment were kept in normal saline, divided into 2 groups, each group contains 10 teeth. The teeth were prepared with 3 mm deep with a diameter of 3 mm was carried out. Then the teeth were washed using running water and dried with a chip blower. The teeth were divided into two groups of samples.

Group I (bioactive composite resin):

The entire surface of the cavity was etched with 37% phosphoric acid for 10 seconds, washed with distilled water, and dried by maintaining its moisture. Then the total-etch bonding was applied with a micro brush and irradiated for 10 seconds. The cavity was applied with a 3 mm deep bioactive composite resin with bulk technique, condensed with a stopper cement, then polymerized for 20 seconds.

Group II (compomer):

The entire surface of the cavity was etched with 37% phosphoric acid for 10 seconds, washed with distilled water, and dried by maintaining its moisture. Then the total-etch bonding was applied with a micro brush and polymerized for 10 seconds. The cavity was compressed with a 3 mm deep compomer by bulk technique, condensed with a cement stopper, then being cured for 20 seconds.

After all the sample teeth had been filled, the sample teeth were covered with red wax apically to prevent penetration of the solution, and the coronal section was coated with nail polish twice except at 1 mm around the restoration. Next, each sample group was put into a beaker and soaked in physiological saline solution, put in an incubator at 37°C for 24 hours for the artificial aging process. The tooth removed from the incubator and dried. The

sample soaked with 1% blue methylene solution for 24 hours at 37°C.

After each group was treated, all sample teeth were washed and dried. The sample were fixated in the apical section, then carborundum disc was carefully directed in the middle of occlusal restoration. Tooth samples were cut in the buccopalatal direction to obtain mesial and distal cuts. Each part of prepared tooth was observed under digital microscope to see the penetration of 1% methylene blue for scoring. Penetration was seen in the coronal to apical direction along the axial wall to the cavity base.

The results of microleakage measurements of bioactive composite resin and compomers were analyzed using the Mann-Whitney U test with a confidence rate of 95% or at $p = 0.05$.

RESULTS

The results of the scoring measurements of two groups of research samples using a digital microscope regarding the extent of the microleakage of the bioactive composite resin obtained the following data:

Table 1. Microleakage's scoring result

	Group	Score				
		1	2	3	4	5
I.	Bioactive	4	5	1	0	0
II.	Compomer	0	0	1	4	5

From table 1, the score of microleakage of the bioactive composite spill is lower than that of the compomer.

The assessment method with scores is as follows:¹²

Score 1: no dye penetration

Score 2: dye penetration up to 1/3 cavity depth

Score 3: dye penetration up to 2/3 of cavity depth

Score 4: dye penetration until it reaches the entire axial wall

Score 5: dye penetration to cover the entire base of the cavity

Table 2. Mean and standard deviation of microleakage

Kelompok	N	Mean	Standard Deviation
Bioactive	10	1,7	6,75
Compomer	10	4,4	6,69

From table 2, the average yield of microleakage of the bioactive composite spill is lower than the compomer.

DISCUSSION

This research was conducted to find out the differences in microleakage in the restoration material of bioactive composite resin and compomer. The results showed that teeth were restored using bioactive composite resins show less microleakage compared to teeth that were compressed using compomers. Bioactive composite resin restoration material shows better results because bioactive composite resin contains urethane dimethacrylate (UDGMA), does not contain bisphenol A, bis-GMA, BPA derivatives and contains the main components in the form of bioactive ion resins, rubberized resins, bioactive glass ionomer, and silicate glass fillers. Crosslinking of methacrylate monomers when combined with self-cure initiators, which can polymerize lightly, self-cure stably, and efficiently during polymerization, will result in strong mechanical properties and good long-term stability.¹³

When polymerized, bioactive composite resin material bound by dental minerals forms strong complex hydroxyapatite resin bonds, so that the adhesion between the enamel and the restoration material is formed very well, and can minimize the occurrence of stress at the restoration interface and the teeth which have an impact on changing the vertical dimensions of the resin, and the possibility the formation of micro-fissures or leakage at the edge of the lift. Bioactive composite resins have a low depreciation value of 1.7.¹⁴

Compomers experienced more microleakage compared to teeth which were

restored using bioactive composite resins because compomer only can be polymerized with a light-curing unit. With the addition of the essential components of GIC, ion releasing fluorosilicate glass particles, which have the ability to release fluoride, is one of the advantages of the compomer.¹⁵ The combination of GIC and composite resin makes the compomer have the same adhesion ability as GIC and has a good aesthetic value as restoration as in the case of composite resins.⁹ However, besides having advantages, GIC has disadvantages such as high solubility and poor abrasion resistance. With high solubility, there will be a lot of material loss in the oral cavity.¹⁶

When curing the bioactive composite resin and the compomer, there is a change in the phase of the material from the gel form to a more rigid/solid form and undergoes a shrinkage process.^{8, 15} When the material is applied to the preparation results and attached to the surface of the cavity, it is polymerized which will produce internal mechanical stress which is then passed on to the tooth structure attached to it. If the contraction power of a composite resin exceeds its bond with the tooth structure, debonding can be broken / loosening of the bond between the composite resin and the tooth. This can be one of the causes of microleakage, secondary caries, and fractures at the margins of the teeth.

During the polymerization process, the resin material will experience shrinkage.^{17,18} Therefore, the resin material requires matrix and filler materials to reduce the shrinkage process. Clinically, to overcome this, acid etching and bonding techniques can also be used to obtain a better attachment between the resin restoration and the surface of the dental tissue.^{19,20}

Some of the reasons mentioned above prove and describe the results of this study in accordance with the hypothesis that the formation of microleakage in enamel using bioactive composite resin material is lower than that of the compomer material, and with statistical results found a significant difference in the formation of microleakage produced between the materials bioactive composite resin

and compomer to tooth enamel. These results are consistent with the other experiment who examined microleakage in bioactive composite resins compared to flowable composite resins. Thus, it is hoped that bioactive composite resins can be a choice of restoration material with a low risk of microleakage.^{18,19, 20}

CONCLUSION

There are microleakages in compomer restorative materials and bioactive composite resins. Microleakage in bioactive resins is lower compared to compomers.

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The Development of the Impact of Early Childhood Caries on the Quality of Life of Children aged 3-5 Years at Paedodonti RSGM Baiturrahmah

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ABSTRACT

Background: The improvement of oral health should be started as early as possible, because in toddlers and preschool children is an important factor for further regulation. dentition. In addition, it also affects the children's ability to speak and their mastery. Efforts to develop the prevention and management of dental caries continue in many countries. Currently, the prevention and management of dental caries has shown positive and dynamic aspects. However, the problem of dental caries still shows a high prevalence, especially in developing countries. **Objective:** The aim of this study was to determine the impact of early childhood caries on quality of life children aged 3 - 5 years based on characteristics in pedodontics, RSGM Baiturrahmah. **Methods:** The purpose of this study was to determine the impact of early childhood caries on the quality of life of children aged 3-5 years based on the characteristics of the pedodontics in Baiturrahmah Hospital. This type of research is quantitative with validity and reliability testing followed by quantitative methods with cross sectional research design. The population was pediatric patients who visited Paedodonti RSGM Baiturrahmah from January to February 2020. Sampling in this study used a total sampling method. In this research, Data collection was carried out by means of researchers giving questionnaires to respondents through the Google Form application. The research was conducted by using a questionnaire or questionnaire method, it is necessary to test the validity. Test the Pearson correlation using the product moment the principle of correlating or linking between each item score or question with the total score obtained from the respondent's answer or questionnaire. **Results:** Based on the "correlations" output, it is known that the calculated r value (Pearson correlation value for all of question with total score is $> 0,218$). all of question is valid. **Conclusion:** the conclusion of this study caries has an impact on early childhood development on the quality of life of children aged 3-5 years in paedodontics RSGM Baiturrahmah.

Keywords: Caries impact, caries impact assessment, quality of life.

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INTRODUCTION

The improvement of dental and oral health should be started as early as possible, because in toddlers and preschool children is an important factor for further regulation. dentition. Apart from that, it also affects the children's ability to speak and their mastery. Efforts to develop the prevention and management of dental caries continue in many countries. Currently, prevention and The management of dental caries has shown positive and dynamic aspects. However, the problem of dental caries still shows a high prevalence, especially in developing countries ¹.

The health condition of teeth and mouth in Indonesia is still very worrying, 90% of the Indonesian population still suffers from dental and oral diseases. Dental caries and periodontal disease are the most common diseases in the oral cavity so this disease is a major problem of dental and oral health ².

Oral health is important for general health and quality of life. Oral health means free of throat cancer, infections and sores in the mouth, gum disease, tooth decay, tooth loss, and other diseases, resulting in limiting disturbances in biting, chewing, smiling, speaking, and psychosocial well-being ³.

Nearly 90% of school-aged children worldwide suffer from dental caries. Meanwhile, according to the Centers of Control Disease Prevention, dental caries is a chronic disease that often occurs in children aged 6-11 years (25%) and adolescents aged 12-19 years (59%) even though dental caries is a preventable disease. Furthermore, according to the Indonesian Ministry of Health, children under the age of 12 in Indonesia suffer from dental caries as much as 89% ⁴.

Improving the quality of life is one of the goals in establishing a health care system in accordance with World Health Organization policies. The dental caries prevention and management plan concerns not only the clinical impact, but also the assessment and measurement of the impact on quality of life. As

life patterns continue to develop, chronic oral and dental problems and develop symptoms and some of the effects caused by these problems require a chronic social and psychological impact assessment method ⁵.

The concept of early prevention has not been facilitated by the development of an instrument for assessing the quality of life of children related to oral health, especially for children under 5 years of age compared to the development of instruments for older children. The area was selected because those under 5 years of age have special characteristics, that is, considering the psychological development status of early childhood, they still cannot interpret the questions of the quality of life assessment instrument. Because of that, parents are considered more effective at solving assessment of the quality of life of their children ⁶.

Dental caries is one of the oral diseases that most often occurs in children. Children are very susceptible to caries because of the anatomical structure of the teeth and the early eruption time. Caries is progressive and its prevalence increases with age in each population. This is associated with a longer exposure time to the etiological factors of caries ⁷.

Advanced caries can affect the health and quality of life of a person causing pain, difficulty sleeping and eating, decreased body mass index, school absence and hospitalization and the costs incurred for treatment of severe caries are higher than in the initial case of lesions. Bad oral conditions, for example the number of missing teeth as a result of damaged teeth or untreated trauma, will interfere with the function and activity of the oral cavity so that this also affects the development of children which has an impact on quality of life ⁸.

Dental caries is a disease caused by many factors. The factors causing caries are the host (teeth and saliva), microorganisms (plaque), substrate (carbohydrates) and added time factor). In addition, other predisposing factors that contribute to caries severity include



caries experience, socioeconomic, age, gender, geography, and behavior towards dental health⁹.

MATERIALS AND METHODS

This type of research is quantitative with validity and reliability testing followed by quantitative methods with cross sectional research design. The population was pediatric patients aged 3-5 years visited Paedodonti RSGM Baiturrahmah from January to February 2020.

Sampling Method

The sampling technique used was total sampling technique. With the research object of patients visited aged 3-5 years Paedodonti RSGM Baiturrahmah from January to February 2020 through distributing questionnaires via google form.

Research procedure

Ethic consent. Licensing for Baiturrahmah Hospital. Subjects signed informed consent. Subjects are given a questionnaire that asks questions related to this research, as for the types of questions asked can be seen in the questionnaire (attached). The questionnaires that have been filled in by the subject are collected, then data are grouped, data processing and analyzed with SPSS. The Pearson correlation using the product moment the principle of correlating or linking between each item score or question with the total score obtained from the respondent's answer or questionnaire.

RESULTS

The development of the impact of early childhood caries on the quality of life of children aged 3-5 years at the Baiturrahmah Hospital which was measured using a questionnaire to 60 respondents at the Baiturrahmah Hospital with the following descriptions:

Table 1. Frequency Distribution of Children Ever Fussy / Anxious

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not	26	37.1	43.3	43.3
	Yes	34	48.6	56.7	100.0
	Total	60	85.7	100.0	

Based on table 1, the results obtained from 60 respondents showed that 26 respondents (43.3%) had children who did not have ever been fussy / anxious and as many as 34 respondents (56.7%) had children who were fussy / restless.

Table 2. Frequency Distribution of Children Feeling Uneasy at Eating and Mimicking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not	30	42.9	50.0	50.0
	Yes	30	42.9	50.0	100.0
	Total	60	85.7	100.0	

Based on table 2, the results obtained from 60 respondents obtained that 30 respondents (50.0%) had children with feelings comfortable when eating and drinking and as many as 30 respondents (50.0%) felt uncomfortable when eating and drinking.

Table 3. Frequency Distribution of Children Never Attending School

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not	19	27.1	31.7	31.7
	Yes	41	58.6	68.3	100.0
	Total	60	85.7	100.0	

Based on table 3, the results obtained from 60 respondents obtained that 19 respondents (31.7%) had children always attend school and as many as 41 respondents (68.3%) have children who have never attended school.

Table 4. Frequency Distribution of Children Having Difficulty Sleeping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not	26	37.1	43.3	43.3
	Yes	34	48.6	56.7	100.0
Total		60	60	85.7	100.0

Based on table 4.4, the results obtained from 60 respondents, it was found that 26 respondents (43.3%) had no children had difficulty sleeping and as many as 34 respondents (56.7%) had children who had experienced difficulty sleeping.

Table 5. Frequency Distribution of Monthly Household Expenditures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<1,500,000	5	7.1	8.3	8.3
	> 1,500,000	55	78.6	91.7	100.0
Total		60	85.7	100.0	

Based on table 5, the results obtained from 60 respondents obtained that 5 respondents (8.3%) have a small monthly household expenditure of 1,500,000 and as much 55 respondents (91.7%) had a large monthly household expenditure of 1,500,000.

Table 6. Frequency Distribution of Number of Children Living at Home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<2	23	32.9	38.3	38.3
	> 2	37	52.9	61.7	100.0
Total		60	85.7	100.0	

Based on table 6, the results obtained from 60 respondents obtained that 23 respondents (38.3%) had the number of children less than 2 people and as many as 37 respondents (61.7%) have children more than 2 people.

Table 7. Frequency Distribution of Characteristics of the Impact of Dental Caries Assessment on Quality of Life of Aged Children 3-5

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10	14.3	14.3	14.3
Good	9	12.9	12.9	27.1
Less	51	72.9	72.9	100.0
Total	70	100.0	100.0	

Based on table 7, the results obtained from 60 respondents were obtained as many as 9 respondents (12.9%) who have a good quality of life criteria, and as many as 51 respondents (72.9%) have poor quality of life criteria. The results of the study in table 4.7 show the quality of life of the respondent which influences the

respondent, namely the development of the impact of dental caries on the quality of life of children aged 3-5 years at Baiturrahmah Hospital.

The correlations test is carried out to find out how well an instrument can measure the concept it should be.

Table 8. Correlations Test

Variabel	Question	Valid	Corrected Item-Total Correlation	
Quality of Life	Children Ever Fussy / Anxious	0,218	0,816	Valid
	Children Feeling Uneasy at Eating and Mimicking	0,218	0.752	Valid
	Children Never Attending School	0,218	0.787	Valid
	Children Having Difficulty Sleeping	0,218	0.670	Valid
	Monthly Household Expenditures	0,218	0.301	Valid
	Number of Children Living at Home	0,218	0,273	Valid

The correlations test is carried out to find out how well an instrument can measure the concept it should be measured and knowing the questions in the instrument are valid. This test is carried out using the product moment method, which is to test each item of the question by looking at the value of the corected item total correlation with the help of the SPSS 23 program provided that the value of $r_{table} > 0.3$, is considered a valid item, while an item that has a value of r_{table} below 0.3 is considered an invalid item and must be excluded from the data and will not be included in further testing. The following is a summary of the results of validity testing for each research variable.

Based on the "correlations" output, it is known that the calculated r value (Pearson

correlation value for all of question with total score is $> 0,218$). all of question is valid

DISCUSSION

From the results of research on 60 respondents at RSGM Baiturrahmah, it was found that 9 respondents (12.9%) had good quality of life criteria, and as many as 51 respondents (72.9%) had poor quality of life criteria. The quality of life criteria from the results of this study provide an overview of the impact of caries in early childhood.

The low quality of life criteria from the results of this study is influenced by dental and oral health factors. Inadequate and undisciplined dental and oral health care directly affects early childhood activities. Many consequences result

from the lack of dental and oral care for children. The resulting consequences trigger caries in early childhood and if left untreated, it will have a serious impact on the health of early childhood.

In line with research conducted by Bunga Nurwati (2019) in her research on the Relationship between Dental Caries and Quality of Life in School Children aged 5-7 years, it is stated that using an analytical observational method based on correlation techniques was carried out on 138 samples of school children. The results of the correlation test using a value of $\alpha = 0.05$ showed an opposite correlation between the dental caries index and the quality of life of school children. Where the index which is the material for the correlation test provides a significant relationship ($p = 0.039$), which means that $p < 0.05$ on the tested variable. The conclusion is that the lower the dental caries index, the higher the quality of life of school children.¹⁰

The research that has been done has shown poor results, meaning that the symptoms caused the child to become fussy, feel uncomfortable at times eating and drinking, refusing to go to school and finding it difficult to sleep. Another factor that causes the lack of dental and oral care for children is economic problems and the number of family members.

1. The child is fussy / restless

The factors causing the lack of research results on respondents, seen from the results of the study which showed that 26 respondents (43.3%) had children who were never fussy / anxious and 34 respondents (56.7%) had fussy children. restless. The factor of children being fussy / anxious was the highest result obtained in the study.

In a study conducted by Sumini, et al (2014) in her research on the Relationship between Consumption of Sweet Foods and the Incidence of Dental Caries in Preschool Children at TK B RA Muslimat PSM Tegalrejodesa Semen Kecamatan

Nguntoronadi, Magetan Regency stated that the impact that occurs when caries is

already experienced from the start is in addition to the function of the teeth as a chewer which is disturbed, fussy, and swollen gums of children. Experience disruption in carrying out their daily activities, so that the child does not want to eat and the worse result can be malnutrition, the child cannot learn because of lack of concentration so that it will affect intelligence¹¹.

2. Discomfort when eating and drinking Factors causing the lack of results

Research on respondents, it can be seen from the results of the study which showed that out of 60 respondents, 30 respondents (50.0%) had children who felt comfortable when eating and drinking and as many as 30 respondents (50.0%) had felt uncomfortable when eating and drinking. This means that there is an average quality of life of the respondent in terms of discomfort when eating and drinking is balanced.

In line with research conducted by Sumini (2014) that high dental caries in children can lead to poor oral and dental health status. Dental caries can cause pain in the teeth and mouth as well as the jaw. Bacterial invasion that has reached the tooth pulp can cause throbbing pain that can affect physiological and psychological activities and functions in children. The majority of pain caused by dental caries is difficulty eating, brushing teeth, sleeping, playing and going to school. 21 Meanwhile, children aged 3-7 years have limited cognitive abilities to determine the quality and quantity of pain, so that parents also find it difficult to distinguish where the pain is located that the child complains of. Functional disorders in the form of difficulty eating and drinking (table 2) also have an impact on the process of absorption of food in the body. This will affect the nutritional status and development which will affect the quality of life of the child. 6,12 Approximately 17% of absent children from school are due to pain and infection of the teeth and mouth. 30 Dental caries has an impact on children's learning activities, but there is no relationship between absence and impaired children's learning achievement¹¹.

3. Don't go to school

The factors causing the lack of research results on respondents can be seen from the results of the study which showed that out of 60 respondents 19 respondents (31.7%) had children who always attended school and as many as 41 respondents (68.3%) had children who had never attended school. It can be seen that a large number of respondents do not attend school. This is because the low quality of life has an impact on children affects their discipline in attending school.

In line with Sumini's research (2014) which states that the impact of dental caries in RA Muslimat PSM Tegalrejo is a toothache that interferes with the chewing process while eating so that children's eating patterns are disturbed, causing decreased appetite and children not attending school ¹¹.

4. Hard to sleep

The factors causing the lack of research results on respondents, can be seen from the results of the study which showed that of the 60 respondents there were 26 respondents (43.3%) Having children has never had trouble sleeping and as many as 34 respondents (56.7%) had children who had experienced difficulty sleeping. The results showed a higher number of children who had difficulty sleeping due to the impact of dental caries.

In line with the research of Bunga Nurwati, et al (2019) which states that advanced caries can affect the health and quality of life of a person causing pain, difficulty sleeping and eating, decreasing body mass index, not attending school and even hospitalization and costs incurred for the treatment of severe caries was higher than in the case of the initial lesion. Bad oral conditions, for example the number of missing teeth as a result of damaged teeth or untreated trauma, will interfere with the function and activity of the oral cavity so that this also affects the development of the child which has an impact on the quality of life ¹⁰.

5. Family monthly expenses

The factors causing the lack of research results on respondents can be seen from the results of the study which showed that out of 60 respondents there were 5 respondents (8.3%) who had a small monthly household expenditure of 1,500,000 and as many as 55 respondents (91.7%) had house expenses. huge monthly ladder of 1,500,000. In this study, the highest family monthly expenditure was over 1,500,000, meaning that family monthly expenses did not affect the impact of dental health in early childhood.

In a study conducted by Bunga Nurwati (2019), around 47.8% of parents have never felt confused about children's oral health problems and around 44.2% of parents have never felt guilty about children's oral health problems. Likewise with the work problems of parents who are left behind due to health and dental problems for children. This shows that around 64.5% of parents never leave work due to dental and oral health problems for their children. Approximately 68.1% of parents said that dental and child health problems have never had an impact on family finances ¹⁰.

6. Number of family members

The factors causing the lack of research results on respondents can be seen from the results of the study which showed 23 respondents (38.3%) had less than 2.

CONCLUSION

Based on the results of research on the impact of dental caries on the quality of life of children aged 3-5 years at Paedodonti RSGM Baiturrahmah it can be concluded that of the 60 respondents, 9 respondents (12.9%) had good quality of life criteria, and as many as 51. respondents (72.9%) had poor quality of life criteria. Based on the "correlations" output, it is known that the calculated r value (Pearson correlation value for all of question with total score is > 0,218). all of question is valid.

The research, which was conducted by filling out a questionnaire distributed to

respondents, showed that the average caries child had a poor quality of life. This results in symptoms in children, namely the child becomes fussy, feels uncomfortable when eating and drinking, does not want to go to school and has difficulty sleeping. Another factor that causes the lack of dental and oral care for children is economic problems and the number of family members.

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The Effect of Softening of Gutta-Percha Using Cajuput Oil in Root Canal Filling with Epoxy Resin and Glass Ionomer Cements Sealers

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ABSTRACT

Background: The failure of root canal treatment is non-hermetic obturation. It could be prevented with the use of sealer material. The sealer with an excellent bond to the dentin is epoxy resin and glass ionomer cement sealer. Eucalyptus oil is a natural substance that could dissolve gutta-percha because it has an antimicrobial effect and is biocompatible. **Objective:** To determine the effect of softening with Cajuput Oil on root canal filling with epoxy resin and glass ionomer cement sealers. **Methods:** The design of this study was pure laboratory experimental, 24 samples of single root canal block, each block was prepared with step back technique and obturation with lateral condensation. The samples were treated differently by the type of sealer used and incubation time. Group of treatment will be dripped with 0.1 ml of cajuput oil for 5 minutes. Compressive loading was performed apico-coronally by Universal testing machine using cylindrical stainless-steel plunger speed of 2 mm/min until softening occurred. The data were processed using a one-way ANOVA and Post-Hoc Tukey test with a significance level of 95% ($p < 0,05$). **Results:** There was a significant effect of epoxy bisphenol resin sealer and Glass Ionomer Cement sealer in softening gutta-percha using cajuput oil. The epoxy resin sealer, which was incubated for 22 days after contact with cajuput oil for 5 minutes, had a higher softening value than others. **Conclusion:** Sealer epoxy bisphenol resin is easier to remove than the Glass Ionomer Cement sealer with cajuput oil solvent at 22 days after incubation.

Keywords: Cajuput oil solvent, Epoxy bisphenol resin sealer, Glass Ionomer Cement sealer, Softening gutta-percha

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INTRODUCTION

Root canal re-treatment is an action which is taken because of inadequate initial treatment and persistent periapical lesions. The patient usually complains of spontaneous pain after initial treatment with varying intensity and is worsened when chewing food.¹ The most dominant cause of failure of root canal treatment is non-hermetic obturation.²

Non-hermetic obturation can trigger the presence of bacteria in the root canal, causing periapical abnormalities. These bacteria produce toxins that can irritate periodontal tissue through the apical foramen, lateral canal, and accessory canal.³ Bacterial contamination can be prevented through good obturation of the root canal by coating the coronal and apical parts as a barrier to bacterial entry and application of sealer material. Sealer effect on obturation density. The sealer can fill empty spaces that are not filled with core material and cover the root canal wall surface during obturation.⁴ The sealers that have a good bond with the dentin wall are Glass Ionomer Cement sealer and epoxy bisphenol resin sealer.⁵

The characteristic of the Glass Ionomer Cement sealer is that it can add root strength to fracture resistance, is biocompatible, and has molecular bonds to dentin.⁶ Glass Ionomer Cement filling materials commonly used are Ketac-Endo (ESPE GmbH, Seefeld, Germany). Ketac-endo is the best filler compared to zinc oxide eugenol, Metapex, and AH Plus. Ketac-Endo can adapt well to root canal walls by forming chemical bonds.⁷ The disadvantage of Ketac-Endo is that it will be difficult to clean when treating root canals and has the lowest bond to gutta-percha compared to the epoxy bisphenol resin sealer.⁵

One type of epoxy bisphenol resin sealer is AH Plus. AH Plus has a work time of 4 hours and average setting time of eight times greater than other types of epoxy-bis-phenol resin sealers seal. This sealer consists of two parts, they are base and catalyst.⁸ The epoxy bisphenol resin sealer material that has been

approved by ISO Standard is AH Plus. AH Plus has an average hardening time value of eight times greater than other types of epoxy bisphenol resin sealer.⁹

In root canal retreatment, gutta-percha removal with a sealer can use a combination of heat techniques, mechanical instruments, and solvents. The solvent is used to dissolve gutta-percha in the apical part of the root canal. One of the solvents most often used to dissolve and take gutta-percha is chloroform. The use of chloroform was chosen because it can dissolve gutta-percha quickly, but it has been known that chloroform is toxic and group 2B carcinogen by International Agency for research on cancer.^{10,22} Due to the toxic nature and carcinogenic potential of chloroform, a safer natural solvent is needed. One of the natural gutta-percha solvents is eucalyptus oil. Based on the results of previous studies, eucalyptus oil has antimicrobial, biocompatible effects so that it does not cause irritation and inflammation in the tissue and is recommended for use in root canal re-treatment.¹¹

The aim of this study to determine the effect of softening with Cajuput Oil on root canal filling with epoxy resin and Glass Ionomer Cement sealer.

MATERIALS AND METHODS

The sample in this study used a single root canal acrylic block. Samples used in the study were 24 root canal blocks that had been prepared with step back technique, with a working length of 13 mm, MAC #30, 2.5% NaOCl irrigation and obturation with lateral condensation and covered with temporary filling. Samples were divided into 2 groups namely using bisphenol epoxy resin sealer (AH Plus, Dentsply) and Glass Ionomer Cement (Fuji I luting and lining, GC Corp, Japan) according to the manufacturer's instructions. For both materials, sealer was coated with Lentulo spiral along the walls of the canal. Each group consisted of 12 root canal samples from acrylic blocks. Each group was left for 15 days, 22 days,



and 28 days in an incubator of 37 ° C to allow the materials to set completely.

Samples were randomly divided into two groups (n = 12) according to the endodontic sealer used and Each group were further subdivided into three subgroups :

Group I (4) : Obturation with epoxy resin sealer + stored in 15 days

Group II (4) : Obturation with epoxy resin sealer + stored in 22 days

Group III (4) : Obturation with epoxy resin sealer + stored in 28 days

Group IV (4) : Obturation with glass ionomer cement + stored in 15 days

Group V (4) : Obturation with glass ionomer cement + stored in 22 days

Group VI (4) : Obturation with glass ionomer cement + stored in 28 days

The next process is a temporary lift that is opened and gutta-percha at 2 mm cavity of the root canal surface is dropped with 0.1 ml of eucalyptus oil and allowed to stand for 5 minutes to obtain the effectiveness of softening gutta-percha.¹²

The last step is to test the compressive strength of plugger penetration on gutta-percha as deep as 5 mm at a speed of 5 mm/min using Universal Testing Machine (UTM) after reaching 5 mm (kgf). Data analysis test was carried out

using the One-Way ANOVA test with significance value of 0.000 ($p < 0,05$). Post-Hoc test with Tukey was conducted to find out which variables had differences and which did not have significant differences.

RESULTS

Research conducted on 24 single root canal blocks regarding the effect of epoxy bisphenol resin sealers and Glass Ionomer Cement on gutta-percha softening using cajuput oil has been completed. The result of the compressive and measurement tests of each treatment group is summarized in figure 1 showing the different compressive strength values in each treatment group with the average group I (57 kgf), group II (31.25 kgf), group III (47.25 kgf), group IV (68.75 kgf), group V (31.75 kgf) and group VI (51.5 kgf). The measurement results obtained were normally distributed data, so the data were analyzed by one-way ANOVA. Table 1 shows the lowest average value found in the SR 22 treatment of 31.25 kgf. This means that after settling for 22 days epoxy bisphenol resin with cajuput oil solvent has the highest softness value compared to other treatment groups.

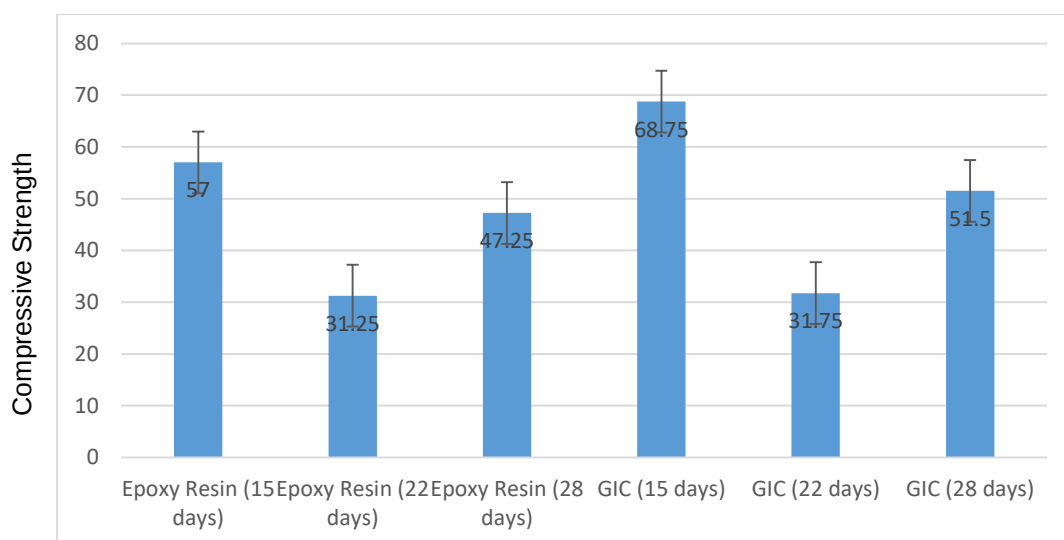


Figure 1. Mean compressive strength between group

One-way ANOVA test that has been done on the data obtained shows a significance of 0,000 which means there is a significant difference between one group and another group or in this study it can be said that there is an effect of epoxy bisphenol resin sealer and Glass Ionomer Cement on gutta-percha use cajuput oil. Then the Post-Hoc test with Tukey was conducted to find out which variables had differences and which did not have significant differences.

Post-Hoc test result with Tukey in the treatment group SR 15 (I) and SR 22(II), SR 15 (I) and GIC 15 (IV), SR 15 (I) and GIC 22(V), SR 22 (II) and SR 28 (III), SR 22 (II) and GIC 15 (IV), SR 22 (II) and GIC 28 (VI), SR 28 (III) and GIC 15 (IV), SR 28 (III) and GIC 22 (V), GIC 15 (IV) and GIC 22(V), GIC 15 (IV) and GIC 28 (VI), GIC 22 (IV) and GIC 28 (VI) have significant differences, whereas in the other groups do not have significant differences because the significance value > 0.05 (table 1).

Table 1. Post Hoc with Tukey Analysis

	SR 15 (I)	SR 22 (II)	SR 28 (III)	GIC 15 (IV)	GIC 22 (V)	GIC 28 (VI)
SR 15(I)	--	0.000*	0.128	0.045*	0.000*	0,661
SR 22(II)	--	--	0.004*	0.000*	1.000	0.000*
SR 28(III)	--	--	--	0.000*	0.005*	0.846
GIC 15(IV)	--	--	--	--	0.000*	0.002*
GIC 22(V)	--	--	--	--	--	0.000*
GIC 28(VI)	--	--	--	--	--	--

*significant group

DISCUSSION

Epoxy bisphenol resin sealer and Glass Ionomer Cement are root canal sealer used with gutta-percha when obturation of the root canal is performed. Based on the research that has been done, the result shows that there is a significant influence on epoxy bisphenol resin sealer and Glass Ionomer Cement on gutta-percha softening using cajuput oil. The result obtained following the hypothesis.

In the research of El Hawary et al (2015) using three kinds of gutta-percha solvents namely eucalyptus oil, orange oil, and chloroform and used vertical condensation filling techniques. Chloroform solvent was used as a control in the study. The results of the study obtained a significant difference between the sample of groups. The study did not look at the ability of eucalyptus oil and orange oil to dissolve root canal filling.¹² Essential oil such as cajuput oil can be an alternative in the re-treatment because it can dissolve most endodontic sealers. It has been reported to be safe,

biocompatible, noncarcinogenic, and valuable.¹⁶ Therefore this study uses eucalyptus oil as a gutta-percha solvent with epoxy bisphenol resin and Glass Ionomer Cement as root canal sealers. The sample in this study was given a length of time for 15 days, 22 days, and 28 days to determine the level of softness of gutta-percha during a penetration test with UTM.

In the results of the average table shows the lowest mean value found in the treatment SR 22 of 31.25 kgf. This means that after settling for 22 days epoxy bisphenol resin with cajuput oil solvent has the highest softness value compared to other treatment groups. Because the epoxy resin sealer has brittle or brittle properties if left to stand for a long time, so this sealer is easier to clean from the root canal and this sealer at the dentin interface had the highest contact with dentin, voids at sealer interfaces are affected by the insertion rate of gutta-percha (GP) points coated with a sealer, the application method of sealer in the canal, the rheological properties of sealers, and atmospheric pressure.^{13,21} Glass ionomer cement-based sealers only have a

chemical bond with dentin, while epoxy resin sealers can penetrate to dentinal tubules, promoting mechanic retention.²⁵

The average test of each treatment group has different results. This is not in accordance with the desired results of this study, namely an increase in the value of softness in each treatment group with the assumption that the longer it is left the more difficult it is to clean.

In the result of this study, it can also be seen that the epoxy bisphenol resin sealer has a greater softening value than the Glass Ionomer Cement at each average comparison of the treatment time group. This is the following research conducted by Bodrumlu et al.¹⁴ that the resin sealer (AH Plus) has a higher solubility rate compared to Glass Ionomer Cement type I (Ketac-endo) using cajuput oil and chloroform solvents after 10 minutes. Following research conducted by Komabayashi¹³ that the resin sealer (AH 26) has brittle or brittle properties if left to stand for a long time, so this sealer is easier to clean from the root canal.

The one-way ANOVA test results, show the influence of epoxy bisphenol resin sealer and Glass Ionomer Cement on gutta-percha softening using cajuput oil. This is influenced by mechanical interlocking bonds by epoxy bisphenol resin sealer and chemical bonds of the polyacrylic acid matrix in the Glass Ionomer Cement into the dentin.¹¹ Glass Ionomer Cement sealer has a fast working time of 7 minutes and a hardening time of 24 minutes when applying materials, but this sealer produces a good seal on gutta-percha and tooth structure.¹³ According to research Lee et. al⁵, Glass Ionomer Cement (Ketac-Endo) sealer is more difficult to clean when re-treatment. In line with research conducted by Moshonov, the Ketac-Endo sealer takes longer than AH 26 and Roth's 801 sealers when cleaned with Gates Glidden bur. This is likely due to the strong bond between the Ketac-Endo sealer and the dentinal wall. In this study using AH Plus sealer, there are differences in characteristics between AH 26 sealers and AH plus. In a previous study, AH 26 was an epoxy resin sealer with high radio-opacity, low

solubility, little shrinkage, and good tissue compatibility, but had detrimental properties, namely the tendency to discolouration and formaldehyde release and was removed with AH Plus. Another advantage of the AH Plus is the form of the application: a paste-on system, which ensures fast and clean mixing and is easier to clean in the case of retreatment.²⁰ AH Plus is an epoxy resin-based sealer used frequently as a reference material because of reduced solubility, long-term dimensional stability, and greater retention to root dentin.²⁴

In the comparison group of Glass Ionomer Cement sealer that was allowed to stand for 15 days after contacting with cajuput oil for 5 minutes with epoxy bisphenol resin sealer which were allowed to stand for 15 days, 22 days and 28 days after contacting with cajuput oil for 5 minutes there was a significant difference, which means the epoxy bisphenol resin sealer which is allowed to stand for 15 days, 22 days, and 28 days after contacting with cajuput oil for 5 minutes has a greater softening ability when compared to the Glass Ionomer Cement sealer which is allowed to stand for 15 days after contacting with cajuput oil for 5 minutes. This is because the AH plus sealer based on epoxy sealer resin has good solubility levels ranging from 0.045% and 0.8%, low shrinkage, long term dimensional stability, bond to dentin and good sealing ability.¹⁵

A significant difference was also found between the comparison group among Glass Ionomer Cement sealer which was allowed to stand for 15 days after contacting cajuput oil for 5 minutes compared to being allowed to stand for 22 days and 28 days after contacting with cajuput oil for 5 minutes with $p=0.000$ and $p=0.002$. The significance value indicates that the Glass Ionomer Cement sealer which is left in place for 22 days and 28 days after contacting with cajuput oil for 5 minutes has a greater softening ability than the Glass Ionomer Cement sealer which is left in place for 15 days after contacting with cajuput oil for 5 minutes. Glass Ionomer Cement Sealer has a low level of solubility in the oral cavity, is biocompatible, has



sufficient working time for 7 minutes and hardening time for 24 minutes.⁹ In a previous study, it was stated that the microhardness of GIC is comparable to composite resin material after 24 hours to 15 days, this means that the longer time will increase the microhardness so that it will be a problem of removal in the event of retreatment.^{16,17,23}

In the comparison group of epoxy bisphenol resin sealer which was allowed to stand for 15 days after contacting with cajuput oil for 5 minutes with epoxy bisphenol resin sealer which was allowed to stand for 22 days after contacting with cajuput oil for 5 minutes, there was a significant difference ($p=0.000$), but it is inversely proportional to the bisphenol resin epoxy sealer which is allowed to stand for 28 days after contacting with cajuput oil for 5 minutes, with a significance value of $p=0.128$, which means that the epoxy bisphenol resin sealer is allowed to stand for 22 days after contacting with cajuput oil for 5 minutes has a greater softening ability when compared to epoxy bisphenol resin sealer which is allowed to stand for 15 days after contacting with cajuput oil for 5 minutes and has a smaller softening ability when compared to epoxy bisphenol resin sealer which is allowed to stand for 28 days after contact with cajuput oil for 5 minutes. This is in line with the statement that the sealer will experience an increase in solubility in a period of 28 days and a change in stability dimensions occurs after the first 4 weeks to 48 weeks.¹⁸

The limitation of this research are applying sealers on root canal acrylic blocks, moisture of acrylic block before sealer application, and volume of sealers. Based on previous research, the removal techniques are dependent on the anatomy of root canal, size of root canal and region of the root canal.^{19,21}

CONCLUSION

There was effect of softening with Cajuput Oil on root canal filling with epoxy resin and glass ionomer cement sealers at different times. Obturation with epoxy resin sealer and

allowed to stand for 22 days has a faster softening effect of gutta percha than epoxy resin sealer 28 days, glass ionomer cement sealer 15 days and 28 days.

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The Management of Complicated Crown Fracture of Anterior Primary Teeth

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ABSTRACT

Background: Injury in the primary teeth and their supporting structures is one of the most common dental health problems observed in children. Injuries in children occurred from an external forces which classified in to dental emergency treatment in pediatric growth and development. A child is perceived to be in a dynamic state of growth, both mentally and physically. Curiosity about surrounding environment and urging to explore may lead to dental injuries. A vital pulpectomy and continued selection of an appropriate restoration after a traumatic injury can maintain the primary tooth in its arch until the time of exfoliation. **Objective:** Reported the management of complicated crown fractures in the upper left primary teeth. **Case:** This report presented a 2 years old boy with complicated crown fracture on the upper left primary teeth. The parents gave the history of trauma related to front region of the jaw and they wanted to restore the involved tooth without getting extraction. After an intra oral examinations, it was observed that crown was fracture with vital dental condition. **Case Management:** After removing the fractured fragment, a vital pulpectomy was conducted in three visit periods at the remaining upper left primary teeth with final glass ionomer cement restoration using strip crowns. **Conclusion:** The importance of reconstruction on anterior primary teeth after traumatic injury provides both functional and aesthetic restorations for the child, what reflects on masticatory efficiency, increased self-esteem and also phonetic improvements.

Keywords: Complicated crown fractures, Primary teeth.

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INTRODUCTION

It is very common for children in the age of 0-6 to get injured as a result from traumatic injury.¹ The recent meta-analysis from *traumatic dental injuries* (TDIs) showed that the prevalence of trauma to primary teeth was 22.7%.²

The majority of dental injuries in the primary and permanent dentitions involve the anterior teeth, especially the maxillary central incisors. Concussion, subluxation, and luxation are the most common injuries in the primary dentition.³

The main purposes of dental care in children are to prevent the spread of dental disease and repair damaged teeth so that they can function properly, and the integrity of the dental arch and oral tissue health can be maintained. Conservative endodontic treatment is performed as an alternative to extraction of primary teeth with injuries without or involving the pulp.⁴

Loss of space can cause malocclusion, decreased masticatory function (especially posterior teeth), impaired speech development (especially anterior teeth), and can cause trauma to children as a result of extraction, as the result of unplanned tooth extraction in the primary dentition period. Maintaining anterior teeth can improve aesthetic function, prevent bad habits, help speech function and prevent psychological effects if the tooth has to be extracted long before the eruption of succedaneous tooth.⁵

The aim of this report was to reported the management of complicated crown fractures of 61 dent in a 2 years old child due to traumatic injury.

CASE

A 2 year old boy came with his parents complaining of a fracture maxillary left anterior tooth. According to the patient's mother, this was due to the patient falling while playing on the terrace about three days ago.

On extraoral examination of the patient, no aberration or abnormalities were found. There were no bruises on the patient's face, there were no wounds on the patient's lips as a result of the incident.



Figure 1. Preoperative view of the exposed pulp of 61 dent

The patient had no history of systemic disease, had never been hospitalized, and had no allergies to drugs or food. The patient had received a tetanus vaccination from the mandatory DPT-HB-HiB vaccination.

Intraoral examination showed that 61 dent had a complicated crown fracture with the condition of the teeth still vital, the pulp was exposed with fracture fragments still attached (figure 1). Meanwhile, on teeth 51, 52, 62, there was a lot of plaque due to the patient's refusal to clean his teeth because of the pain he felt for 3 days. The patient's mother said that the patient was very fond of biting his lower lip after the incidence which resulted in fracture of the patient's maxillary left anterior tooth (figure 2).



Figure 2. Patient biting his lower lip.

CASE MANAGEMENT

Infiltration and intrapulp anaesthesia were conducted on 61 dent on the first visit and fragments were then taken and the pulp taken using an endodontic, bearded pulp brooch until the pulp tissue was completely removed, bleeding with sodium hypochloride solution (NaOCl 2.5%) and distilled water was irrigated. Due to the patient's condition, which included crying and wriggling during the treatment, it was not possible to take a radiograph to determine the working length.

Root canal preparation was carried out using K-file size 15 to 30. In primary teeth the preparation was done only to clean the pulp tissue, not to expand the root canal. The root canals were then irrigated using a 2.5% NaOCl solution and distilled water and then sterilized using $\text{Ca}(\text{OH})_2$ paste which was applied using lentulo. Then using a temporary filling the cavity was closed (figure 3).



Figure 3. The cavity of 61 dent had been closed with a temporary filling, the patient was seen biting his lower lip

One week later at the second visit, a subjective examination of the patient was performed and there were no complaints. The results of the objective examination were negative percussion, negative palpation and dry root canal after sterilization, then obturation could be performed.

Working area was isolated first, then the root canal was irrigated using 2.5% NaOCl solution and rinsed with distilled water, then dried using paper points. Furthermore,

obturation of the root canal using a paste containing Calcium Hydroxide and iodoform, then using a cotton pellet, pressure was applied so that the root canal can be filled properly and temporarily filled. To ensure that the obturation of the root canal was hermetic, a radiograph was performed.

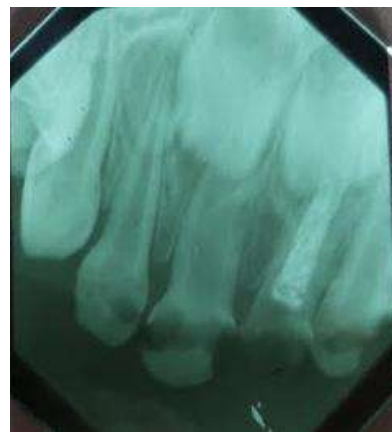


Figure 4. Post-obturation periapical radiographic.

Root canal filling was hermetic as seen from the evaluation of radiographic examination. The cavity was lined with GIC base and lining and temporary filled. The patient was instructed to come back after 1 week.

One week later at the third visit, a subjective examination of the patient was performed and there were no complaints, the objective examination showed negative percussion and negative palpation. Post-obturation radiograph was hermetic without any periapical lesions (Figure 4). The final restoration was carried out using glass ionomer cement fillings with the aid of strip crowns (Figure 5 and 6).



Figure 5. Strip crowns.



Figure 6. The final restoration was carried out using glass ionomer cement fillings

DISCUSSION

In this case, a vital pulpectomy was performed on 61 dent because the patient was brought to the clinic three days after the injury and the pulp tissue appeared to be out of the cavity so devitalization was not possible. Pulpectomy treatment on 61 dent was to prevent further infection, then the tooth can be maintain until the exfoliation time. Maintain masticatory function, maintain space for permanent teeth, prevent impaired speech, prevent bad habits.⁴ In this case, patient's starting to show, the bad habit of biting the lower lip.

Because the child is at early age and uncooperative, the mechanical procedures for root canals of Primary teeth are not optimal, so the treatment of 61 dent a vital pulpectomy depends on the use of irrigation and root canal sterilization and the use of antimicrobial root canal obturation materials. Root canal irrigation procedure is one of the important factors in sterilization. Because it has anti-bacterial effects, it can neutralize toxins and remove the remaining pulp tissue. 2.5% NaOCl solution and distilled water are used as irrigants in this case.^{6,7}

Ca(OH)₂ material was used for sterilization because it has a high pH ranging from 12.5 to 12.8 and OH⁻ ions can inactivate membrane enzymes from the bacterial cytoplasm, so that it can interfere the growth process, cell division and metabolic activity of bacteria (bactericidal).⁸

Calcium Hydroxide material with iodoform paste with syringe packaging is used for obturation, it allows the material to enter deep into the root canal and then condense with cotton pellets. For pulpectomy in primary teeth, the ideal root canal obturation material should have antibacterial effects, harmless to permanent tooth germs, reabsorbed as well as primary tooth root resorption, not irritate periapical tissues, and easy to use.^{10,11}

The mixture of Calcium Hydroxide and iodoform paste, has the analgesic effect was produced due to the reaction of Calcium Hydroxide with CO₂ as a pain inhibitor. Furthermore, Calcium Hydroxide with a mixture of iodoform has the effect of inhibiting macrophage phagosity so that it can reduce inflammatory reactions, has the ability to dissolve necrotic tissue, both in aerobic and anaerobic environments.⁹

As viewed in biological properties of the material, Calcium Hydroxide is alkaline because it contains hydroxyl ions, as is well known, when inflammation occurs, the inflamed tissue will be in an acidic environment due to the activity of the components that cause inflammation. As an inflammation is treated with Calcium Hydroxide, the hydroxyl ions from Calcium Hydroxide will neutralize the acidic atmosphere of inflammation so that the healing process can take place more quickly.^{12,14}

Glass ionomer cement restoration materials tend to be more brittle than composites but have the advantage of adherence to tooth substance, both enamel and dentine, without etching. The coefficient of expansion of glass ionomer is very close to dentine, and once set these materials remain dimensionally stable even in the mouth where the moisture and temperature levels are constantly changing.

Added with the aid of strip crowns as a mold to form the missing part of the crown so that could made it easier for the operator to form a good aesthetic restoration.^{13,16}

CONCLUSION

The reconstruction of primary anterior teeth after traumatic injury provides both functional and aesthetic restorations for the child, what reflects on masticatory efficiency, increased self-esteem and also phonetic improvements. The consequences of delayed treatment due to traumatic injury could cause complications that interfere with the growth and development of permanent teeth stage in the future, that will received much attention, concern and cost later.

Nevertheless, it becomes essentially important a clinical and radiographic follow up of the child until the appropriate exfoliation of the primary teeth and eruption of the permanent teeth. Post-obturation evaluation showed that pulpectomy of 61 dent was successful. The patient's subjective examination had no complaints, the objective examination of percussion was negative and palpation was negative, and the radiographic examination showed hermetic obturation and there were no periapical abnormalities. Glass ionomer cement restoration was still in place and had a good shaped when the patient comes for control and could prevent the patient's bad habits that had begun to appear.

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