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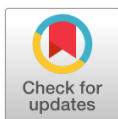
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Management of angular cheilitis in children

Fajriani*



CrossMark

Abstract

Objective: This paper aims to inform colleagues about management of angular cheilitis in children. Angular cheilitis is a type of oral soft tissue disease that can occur in children and adults, the condition is characterized by cracks and inflammation on both corners of the mouth.

Methods: Angular cheilitis or perleche is an inflammation reaction on the corner of the mouth often started from mucocutaneous aberration and continued to skin.

Results: This disease can not cause severe disorder, it quite disturbs one's activity and physical appearance. Mild Angular cheilitis will recover itself over times. However severe conditions can cause pain and bleeding.

Conclusion: Treatment of angular cheilitis is by eliminating the etiology factors. Secondary infection must be remembered

Keywords: Management, Angular cheilitis, Child

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Introduction

Angular cheilitis occurs more in children and it is caused by children sensitivity against certain contact agents like toys, foods, sunlight, allergy against medicines, cosmetics and long term anti-biotic treatment. Disease attacking the corners of the mouth is often cause pain when patients experience dry mouth or xerostomia. This disease can also be caused by vitamin B complex deficiency, blood iron deficiency, denture sore mouth and other factors such as breathing through mouth, wetting lips with tongue and licking the corner of the mouth with tongue. Angular cheilitis also called perleche or angular cheilitis is a lesion marked with fissures, cracks on corner of lip, reddish, ulceration accompanied by burning sensation, pain and dryness on the corner of the mouth. In severe cases, these cracks can bleed when opening the mouth and cause shallow ulcer or krusta.¹⁻³

Angular cheilitis can be a serious problem if it is not handled properly. This disease progression is so fast. There for there should be no delay in treatment if symptoms of angular cheilitis occurred and very clear. Not limited to a certain age, regardless of their sex all can be affected by this disease. Frequently in child aged 4-6 years.^{3,4}

Clinically, angular cheilitis can occur in chronic condition, where the corner of mouth or mouth inflamed because of wound infection. Infection that caused this condition is a type of fungi or bacteria. Affected area usually feels pain and healing period depends on the treatment. All ages can be affected by this disease. The more vulnerable ones are those with a weak immune system, diabetes mellitus and

those that flooded their saliva on the corner of their lips. Patients who have undergone head and neck radiation also runs the risk of developing angular cheilitis, also those who have iron deficiency, vitamin B12 deficiency and folic deficiency.²⁻⁵

Methods

Angular cheilitis or perleche is an inflammation reaction on the corner of the mouth often started from mucocutaneous aberration and continued to skin. It characterized by reddish lesions that spread in form of fissures, skin appear eroded, ulcer surface plated and accompanied by subjective symptoms such as pain, burning sensation and aches. Perleche term used for angular cheilitis caused by vitamin B complex deficiency, but now has been generalized to all angular cheilitis with various etiologies.⁵⁻⁷

Factors that caused angular cheilitis are candidiasis, trauma on oral cavity, nutrition status of children, manifestations of systemic disease and viral infections. The cause of angular cheilitis prominent in children is a nutritional deficiency. Nutritional deficiency is usually caused by inadequate intake of vitamin B complex (riboflavin), iron and folic acid.^{7,8}

Clinical Features is characterized by the existence of fissures and erythema on the corners of the mouth, which extended to bottom lip and possibly extended to buccal mucosa. Angular cheilitis has other names, perleche, angular cheilosis and angular stomatitis. Angular cheilitis initial symptom is itchiness on the corner of the mouth and it looks

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corner of the mouth and looks appearance inflamed skin and red spots. At first, it is not dangerous but it will feel pain on the corner of the mouth and bleed easily that is caused by the movement of the mouth such as laughing or talking. The inflammation severity is characterized by cracks on corner of the mouth and some bleeding when the patient's mouth opened in angular cheilitis associated with nutritional deficiencies can be seen the depletion of tongue papillae (depapillated tongue) due to iron deficiency. The tongue is red and shiny (depapillated glossy red tongue) in patients.^{8,9}

Management and treatment to prevent the growth of candida albicans, one of the causes of angular cheilitis on the corner of the mouth, is to re-balance the oral environment. The most important thing is to maintain a healthy body so that the immune system is maintained and not susceptible to disease and to eat foods that are nutritionally balanced and needed by the body. Besides that we also undertake maintenance of oral hygiene by brushing your teeth. By brushing teeth, oral hygiene will be maintained in addition to avoiding the formation of carries in the teeth, tooth and gum disease.⁸⁻¹⁰

Results

Treatment of angular cheilitis in children does not different to adult. The treatment depends on its etiology. If the specific etiology remains unfound, these lesions can be difficult to cure and it can last up to several years. It must be remembered that infection is secondary etiology. If the main cause is not treated, the treatment of infection will not produce a permanent result. For example, breathing habit through mouth in child must be stopped, same like the other habits. If it is caused by systemic disease, local treatment will not be successful if not accompanied by systemic treatment.^{10,11}

Angular cheilitis caused by vitamin B deficiency should be treated by providing vitamin B complex supplement or multivitamin that contain vitamin B. However, deficiency of one type of vitamin is usually followed by nutritional deficiency, hence in the treatment, multivitamin administration is more effective than vitamin B complex alone. Reported treatment of disease caused by vitamin B12 deficiency with vitamin therapy can be healed in 3 weeks. Antimicrobial administration on patients with angular cheilitis caused by nutritional deficiency is only shortened the healing time. Because most of the infection that occur can heal itself without antimicrobials, body's defense system should be maintained or increased by administering vitamin supplements or multivitamins.^{11,12}

Discussion

Angular cheilitis occurs in children frequently because of lack of nutrition. Bacterial infection and mechanical factor often occur in children with bad habits such as licking the corner of the lip and sucking finger. These will accumulate the saliva on the corner of the mouth and unwittingly provide perfect environment for infectious agents in causing angular cheilitis. Trauma on mouth cavity can be caused by mechanic, chemical and thermal. Mechanical trauma can be caused by irritation from sharp cups, orthodontic instruments and biting lips or cheeks. Diagnoses of this type are usually not difficult depending on the position, shape and size of the ulceration which should correspond to the suspected cause. Ulceration usually begins to heal within 10 days. If healing does not occur then the other causes of ulceration should be suspected.^{3,4,7}

Nutritional Status of Children in which the main cause of angular cheilitis in children is a nutritional deficiency caused by lack of vitamin B complex (riboflavin), iron and folic acid. In causing angular cheilitis, each of the etiologic factors, especially nutritional deficiency is correlated with environmental conditions. In students the most influential ones are environmental conditions in both family and school. Referred environmental conditions can be family's socioeconomic level, indigenous influences in the family, habits or eating patterns in children and knowledge about nutritions.^{4,8}

Various manifestations of systemic disease in which a patient suffering from a disease that affects the entire body and show signs and specific oral symptoms such as haematological disorders: anemia due to iron deficiency, endocrine disorders: diabetes mellitus, viral infections: human immunodeficiency virus, advanced malignant disease, leukemia, hematological disorder in patients suffer from anemia. Iron deficiency has a tendency for some diseases of oral mucosa includes: aphthous ulceration, angular cheilitis, pain and cracks on corners of the mouth caused by the fungus candida albicans and by staphylococcus aureus bacteria. Mucosal atrophy is mucosa that appears reddened and smooth. It is important to think of iron deficiency, anemia in patients with aphthous ulceration and angular cheilitis. If iron deficiency anemia is not detected, other causes must be investigated.^{9,11}

Virus infection is not like bacteria that consist of a single cell and is able to grow independently. Virus consists of small nuclear fragment surrounded by protein coat. It can not divide or replicate itself and to survive it must gain access to live inside cells. Upon entering host cell, it used its process of synthetic in host cell to reproduce and in the process, often damaging the host cell. In other cases,

the host will destroy virally infected cells in order to eliminate the virus. This is the cellular destruction that is responsible for many of the clinical features of viral infections that affect the oral cavity. The time needed for the virus to infect the host, to replicate and to damage cells and thus clinical symptoms might occur on days 3-21 and is known as the incubation period. Most viruses with severe infections between 10 and 14 days, after the hosts had an effective immune response and the infection resolved. Other less virulent infection may last only a few days. Viral infection generally affects younger age groups and viral infections that occur in older age groups possibly underlying immunosuppression.^{5,10}

Conclusion

Angular cheilitis appears diagnosed with herpes lesions labialis, ulcers, impetigo, and secondary syphilis lesions. Treatment of angular cheilitis is by eliminating the etiology factors. Secondary infection must be remembered. If the primary cause is not corrected, the treatment of the infection will not produce a permanent cure.

Conflict of Interest

The authors report no conflict of interest.

References

1. Muray JJ, Nunn J. H. Steele J. The prevention of oral disease 4th ed. New york: oxford University Press; 2008.
2. Boedihardjo. Pemeliharaan kesehatan gigi keluarga. Surabaya: Airlangga University Press; 1985.
3. Gayford JJ, Haskel R. Penyakit mulut (clinical oral medicine). Jakarta: EGC; 1990.
4. DowlW.Effect of angular cheilitis on children and teenagers.[internet].Available at URL: <http://www.EzineArticles/childandac.html>. Accesed 25December 2010
5. Lubis S. Hubungan status gizi dengan keilitisangularis pada anak umur 6-12 tahun di enam panti asuhan di Kota Madya Medan. Dentika J Dent 2006;11: 180-181.
6. Tydesley WR. A colour atlas of orofacial disease (Atlas berwarna penyakit orofasial) 3th ed. Jakarta: Widya Medika; 1991.
7. Faiz R. Angular cheilitis overview and symptoms of angularcheilitis.[Internet]Available at: <http://www.articlesbase.com/skin-care-articles/angular-cheilitis-overview-and-sypmtoms-of-angular-cheilitis-285629.html>>.Accessed 28 December 2010
8. Deritana N, Kombong A. Gizi untuk pertumbuhan dan perkembangan. Jayawijaya: J WATCH; 2007. p. 5-18
9. Rippon JW. Medical mycology. 3th ed. Philadelphia : WB SaundersCo; 1988.
10. Hari S. Angular cheilitis: Review of etiology and clinical management .K.D.J.[Internet] Available at: <http://www.trivandrum.co.uk>. Accessed 27 December 2010.
11. Langlais RP, Craig SM. Atlas Berwarna : Kelainan Rongga Mulut yang Lazim. 1st ed. Jakarta: Hipokrates; 2003. p. 34.
12. Morison MJ. Manajemen luka. Jakarta: EGC; 2003. p. 1-21.



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Management pain and anxiety in endodontic treatment



CrossMark

Andi Sumidarti,* Wahyuni S. Dwiandhany

Abstract

Objective: The aim of this paper is to improve the understanding of pharmacology and procedures for pain and anxiety management in endodontic treatment. So, it is important to determine accurate diagnosis, management and drug administration.

Methods: Dental pain is a common symptom that most often causes patient to seek dentist. A survey conducted by the American Association of endodontics revealed that more than half patients who come to dentist have experienced pain, which originate from the teeth or of the

surrounding tissue, can causes difficulties in handling, also the anxiety of the patient.

Results: Understanding the pain experienced by patient will help dentist to determine when to make an action. Most patient being fear with pain, so they delay to get treatment from dentist and lead to the development of further infection and inflammation.

Conclusion: Treatment plan includes control of pain before and after determine the effects of drugs that will be recommended for patient.

Keywords: Pain, Anxiety, Endodontic treatment

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Introduction

One of the goals of endodontic treatment is to prevent and to eliminate pain occurred. During the treatment a lot of patients will feel anxious knowing they will experience pain that obtained during the treatment coupled with inflammatory effects.^{1,2}

The use of local anesthetic will reduce and lower the threshold of pain, but the post-treatment pain is common in some procedures, especially in patients who have experienced pain prior to treatment.^{1,2}

Some clinicians report that management of the pain experienced by the patient can be a difficult thing, especially during endodontic treatment. Patients who undergo irreversible pulpitis or symptomatic periodontitis experienced central sensitization (increased excitability of neurons beneath the central nervous system) and peripheral sensitization (decrease threshold and increased response at the end of the peripheral nociceptor).^{1,3,4}

Inadequate pain management during endodontic treatment may be caused by changes in the periapical tissues, inflammation or infection of the pulp and apical pathology that can lower the pH of the tissue in the area around the teeth.⁵ Anxiety to pain arising during endodontic treatment usually associated with treatment procedures and not the post-treatment period. Although control pain in endodontic treatment is

not always difficult, but there are a lot of things when the dissatisfaction of patients can not be treated.³

The aim of this paper is to improve the knowledge of pharmacology, pain and anxiety management in endodontic treatment.

Methods

In endodontic treatment, clinician must be able to handle the pain that arises in associated with treatment. According to the survey, most patients being fear with pain, so they delay to get treatment from dentist and lead to the development of further infection and inflammation.^{3,6,7}

Common cause of tooth pain generally due to caries, inadequate restoration/defective or trauma, Benders claimed 85% cases of pain in teeth come from pulp and periapical disease.⁶

Results

Study by Colleagues for Excellence demonstrate an effective and easy strategies to manage tooth pain in systematic framework or guidelines for the treatment of pain effectively and efficiently named 3D playbook treatment of pain: diagnosis, dental treatment and drugs.⁶⁻⁸

1. Diagnosis: process of identifying a disease or

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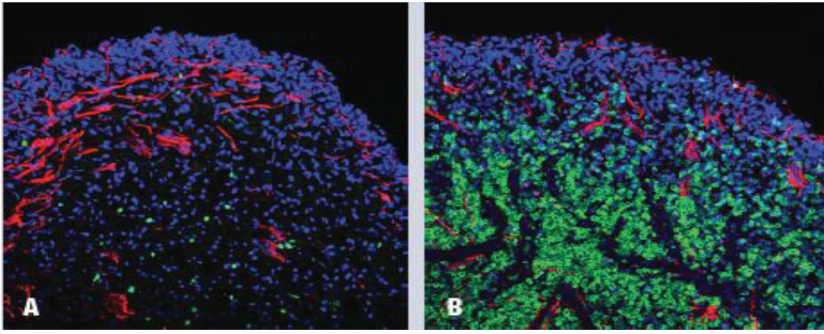


Figure 1 Confocal microscopic images normal dental pulp, A. Dental pulp from a patient with a diagnosis of symptomatic irreversible pulpitis, B. Red depicts nerve endings (staining for NFHJ) green depicts leukocytes (CD45) and blue indicates cell nuclei (DAPI).

abnormal condition and collect and evaluate any signs or early symptoms experienced by the patient and yield an investigation. Without a proper, clear/accurate and effective diagnose, clinician can not treat nor provide proper care.

2. Dental treatment: treatment is performed to reduce pain include Root Canal Treatment (RCT) that is effective to reduce pain and discomfort due to increase inflammatory mediators.
3. Drugs: another way to overcoming pain by prescribed analgesics such as NSAIDs and the application of a local anesthetic at least reduce pain before RCT.

Pain and anxiety management in endodontic treatment include:^{3,6,7}

1. Psychological approaches include 4C, namely: control, communication, concern and confidence.
2. Control of pain before treatment include: timely and accurate diagnosis as well as lower levels of anxiety.
3. Preoperative non steroidal anti-inflammatory drugs may increase the effectiveness of local anesthesia.
4. Intra-operative pain control include: the effectiveness of the use of drugs/local anesthetic and operative techniques.

Discussion

Accurate diagnosis and pain control is essential, bear in mind that there is possibility where the pain does not came from the teeth, therefore it is important to know the pain that comes from the teeth and which came from the surrounding tissue.⁷ To determine whether the pain came from the teeth, the first and the most important phase that dentist should be able to notice patient's major complaint

by examining the suspect teeth by doing percussion on the tooth with the mouth mirror handle or instrument as tooth slooth or using cold spray, that is important to know the source of the pain comes from the teeth or not.⁷

The treatment to perform include root canal treatment which is considered effective to reduces pain and discomfort that come from inflammation and an increase in the mediators such as bradykinin, prostaglandins and cytokines.⁷

Endodontic treatment on a tooth with irreversible pulpitis and apical periodontitis have higher pain level. Age, gender and length of treatment are factors associated with increase risk of pain experienced during endodontic treatment procedures.^{1,9,10}

Pathological inflammation or infection of the pulp and perapical can lower the pH of the tissue around the teeth. The degree of decrease in pH tissues surrounding area is varied and decrease pH will reduce the effects of anesthesia that go into a neural network since more RNH⁺ ion is formed than RN. RNH⁺ ions can not migrate through the neural network so the effects of anesthesia also reduced.³

One method for obtaining tissue anesthesia in decreasing pH is by depositing a larger volume of anesthetic on the inflamed area, so we can get larger number of RN inside the neural network.³

Anesthetic failure often occurs in endodontic treatment, so the pain management can be solved by minimizing overextension file through the apical foramen in cleaning and shaping stage. Emphasis endodontic instruments beyond the apical foramen can push various irritant to periapical tissue that can cause pain. Some researches suggests that pre-treatment in patients using NSAIDs, inhibit the production and release of inflammatory mediators, therefore it was become effective and comfortable pain management strategy recommended before endodontic treatment.^{7,11} The combination of pre-treatment NSAIDs using local anesthesia can produce almost 70 % of patients reported no pain or little, even seven hours after treatment.

NSAIDs will inhibit the inflammatory mediators, thereby reducing pain, especially post RCT pain of moderate to severe and a combination of acetaminophen and ibuprofen are the appropriate option to relieve moderate to severe pain after RCT.² However, the clinician should understand that there is contraindications for patients with ulcer, colitis ulcerative, uncontrolled hypertension and patients with renal disease or in the third trimester of pregnancy.⁷

Goals of canal treatment is to prevent or eliminate the pain, although procedures can be done without using local anesthesia. Some studies suggest

the existence of mild pain post chemo-mechanical preparation, ranged 10-30% and between visit 14-16% and reported a correlation between pain and anxiety.²

Conclusion

Pain management caused by inflammation is a common clinical problem, so the effectiveness of pain management begins with determining an accurate diagnosis, treatment plan includes control of pain before and after treatment and determine the effects of drugs that will be recommended for patient.

Conflict of Interest

The authors report no conflict of interest.

References

1. Egea SJ, Cabello CR, Carerras LM, et al. Pain associated with root canal treatment. *Int Endontic J* 2009;42: 614-620.
2. Mehrvarzfar PV, Abbott MA, Delvarani SA, et al. Effects of three oral analgesics on postoperative pain following root canal preparation a controlled clinical trial. *Int Endontic J* 2012;46: 76-82.
3. Torabinejad M, Walton RE. *Endodontics principle and Practice*. 4th ed. St.Louis: Saunders Elsevier; 2009. p. 129-143.
4. Osbim K, Isbi T, Ogura Y, et al. Clinical investigation of patients who develop neuropathic tooth pain after Endodontic proceducer. *J Endo* 2009;35: 958-961.
5. Risso AP, Antonio JI, Marcos CP, et al. Postoperative pain and associated factors in adolescent patients undergoing two visit root canal therapy. *JC Austra Society Endo* 2008;35: 89-92.
6. Cohen S, Burns R. *Pathways of the pulp* 8th ed. Mosby Elsevier; 2011. p. 40-46.
7. *Endodontics colleagues for excellence winter 2015 A³D³ approach for treating acute pain*. Chicago: American association of Endodontists; 2015. p. 1-6.
8. Chong BS. *Harty's endodontics in clinical practice* 6th ed. Churchill Livingstone Elsevier; 2010. p. 14-15.
9. Moderesi J, Dianat O, Soluti A. Effect of the pulp inflammation on nerve impulse quality with or without anesthesia. *JOE* 2008;34: 38-41.
10. Pochapski TM, Santos AF, Andrade DE, et al. Effect of preTreatment on postendodontic pain *JOE* 2009;108: 790-795.
11. *Endodontics colleagues for excellence management of acute pain*. Chicago: American Association of Endodontists; 1995. p. 1-4.



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Inhibition growth of pomegranate seeds extract against streptococcus sanguis: the cause of recurrent aphthous stomatitis



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Nanan Nur'aeny,¹ Wahyu Hidayat,¹ Dani R. Firman²

Abstract

Objective: Pomegranate (*punica granatum* L.) seeds contain high of phytonutrients and phytochemicals, rich in polyphenol antioxidants namely tannins and flavonoids which also have antibacterial activity. *Streptococcus sanguis* is a bacterium known as one of the factors causing Recurrent Aphthous Stomatitis (RAS). To examine the potential antibacterial of pomegranate seeds against *S. sanguis*.

Material and Methods: In vitro study of pomegranate seed were extracted with maceration method using 70% ethanol as the solvent to obtain stable extract, continued with phytochemical screening against phenolic, flavonoids, alkaloids, steroids, triterpenoid, saponins and tannins. The extract was evaluated for Minimum Inhibitory

Concentration (MIC) and Minimum Bactericide Concentration (MBC) against *S. sanguis* ATCC 10556, using microdiluted method through 96 wells microplate.

Results: Chlorhexidine was used as positive control while 70% ethanol was used as solvent as well as negative control. Phytochemical screening gave positive results for phenolics, flavonoids, steroids, saponins and tannins. Microdilution test showed the concentration of 500 ppm as MIC and MBC value at 2000 ppm.

Conclusion: Pomegranate seeds extract have a growth inhibitory against *S. sanguis* with MIC value of 500 ppm and 2000 ppm as MBC.

Keywords: Pomegranate seeds, *Streptococcus sanguis*, Recurrent aphthous stomatitis

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Introduction

Recently people start to choose herbs as medicine to cure various diseases because it is affordable and also quite efficacious. Pomegranate (*punica granatum* L.) is a long-living tree native from the Middle east, cultivated in the subtropical to the tropic regions.¹ It has many benefits for health and usefulness as traditional medicine, used in several systems of medicine for a variety of ailments. In Indonesia as one of the country in the tropic region, Pomegranate is easy to grow in the home yard as well as an ornamental plant at the lowland to below 1000 m dpi region.

Pomegranate is a very versatile fruit which can be directly eaten fresh, or made as juice. It contains of high phytonutrient and phytochemical as well as rich in tannin antioxidant. Antioxidant is very beneficial for maintaining health and treating diseases. The main antioxidant in pomegranate is polyphenol which contains flavonoids, tannins and vitamin C. Besides as antioxidant, flavonoids, tannins also have antibacterial action. Jurenka¹ stated the therapeutically beneficial pomegranate constituents are ellagic acid ellagitannins (including punicalagins), punicalic acid, flavonoids, anthocyanidins, anthocyanins and estrogen

flavonols and flavones.¹ In Ayurvedic medicine the pomegranate is considered as “a pharmacy unto itself” and is used as an antiparasitic agent, a “blood tonic” and to heal aphthae, diarrhea and ulcers.¹ The MIC of adherence of pomegranate against *S. mitis*, *S. mutans*, *S. sanguis* and *C. albicans*.²

In daily life there are certain people who often have lesions in their mouth and people call it as aphthae. Medically this lesion known as Recurrent Aphthous Stomatitis (RAS), can occur at any part of the oral cavity accompanied with pain and may occur recurrently. It is a mild disease and not life threatening, self healing within 10-14 days without treatment but may interfere with eating and talking that can decrease the quality of life.³⁻⁵ Scully⁶ stated that the number of RAS incidence of about 10-25 % in a population. It is a quite large number, so it is relevant if many researchers tried to find the best treatment for RAS.⁶

The etiology of RAS is still unknown, but there are some predisposing factors which were thought played an important role. Those factors are local factors, allergy, bacteria, immune status, haematinic, hormonal and psychological stress.

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One of the bacteria suspected as the cause RAS is *S. sanguis*.^{6,7}

Until now only a few studies about pomegranate were reported, especially the study of the seeds as a drug that can inhibit the growth of bacteria *S. sanguis* in RAS. The purpose of this study was to find out the MIC and MBC of pomegranate seeds extract against bacteria in RAS *S. sanguis*.

Material and Methods

Pomegranate (*punica granatum* L.) fruits used in this study were obtained from the farmers' gardens in Cisarua Lembang, Indonesia. Standard *S. sanguis* (ATCC 10556) strains were used. The study was conducted at The Chemical Laboratory, Padjadjaran University. The process was started with preparing the material and plant determination i.e dried the pomegranate seeds under the sun, mashed it into powder and subjected to extraction with 70% ethanol. The powder were soaked in 70% ethanol as the solvent for 24 hours, the macerat were screened then evaporated with the rotary evaporator to obtained a stable extract. Then it was continued with phytochemical screening against phenolic, flavonoids, alkaloids, steroids,

triterpenoid, saponins and tannins. The next step was to determine the MIC and MBC of pomegranate seeds extract against *S. sanguis* ATCC 10556 through several stages i.e bacteria rejuvenation procedures, made the Mueller Hinton broth, determined the Optical Density (OD), antibacterial test with Disk Diffusion Test. The determination of MIC was carried out using microdiluted method through 96 wells microplate. Every two rows of wells duplodata was used namely media and samples in series 1 and 2. The media and the solvent on a series 3 and 4 media, sample and bacteria *S. sanguis* in series 5, 6 and on series 7, 8 were filled with media, solvents and the bacteria *S. sanguis*. Chlorhexidine was used as positive control while 70% ethanol as the solvent as well as negative control.

Results

The weight of pomegranate seeds powder sample was 364 gram, after three steps of maceration process with 70% ethanol, 37.14 gram of extract were obtained. The depreciation value was 10.2 %.

Phytochemical tests was performed after Pomegranate seed extract were obtained. It was proposed to identify the content of secondary metabolites which was presented in the sample. The phytochemical screening showed positive result for phenolic, flavonoids, steroids, saponnins and tannins [table 1](#).

The next step was assessing the extract for the MIC and MBC against *S. sanguis*. The result of inhibitory test showed that there was antibacterial activity marked by the formation of inhibition zone against *S. sanguis* [table 2](#) and [figure 1](#).

According to the above table and figure, there were inhibition zones on pomegranate seed extract sample at the concentration of 20.000, 10.000 and 5000 ppm. 70% ethanol as the solvent was also act as negative control while chlorhexidine as positive control showed the inhibition zone at the concentration of 2000 ppm.

The results showed that there was inhibition activity against *S. sanguis* of each concentration. That was the reason why it was necessary to do MIC test as the next step of anti-bacterial test. The MIC test was conducted using microdilution method through 96 well microplates. Every two rows of the wells using duplodata, which was media and sample in rows 1 and 2. The Media and solvent were in rows 3 and 4. The media, sample and *S. sanguis* bacteria were in rows 5 and 6. The media, solvent and *S. sanguis* bacteria were in rows

Table 1 Screening of secondary metabolites

| No. | Secondary metabolites | Test method | The results |
|-----|-----------------------|---|-------------|
| 1. | Phenolic | FeCl ₃ 5% Reagent | + |
| 2. | Flavonoids | HCl conctr + Mg Reagent | + |
| | | H ₂ SO ₄ 2N Reagent | + |
| | | NaOH 10% Reagent | - |
| 3. | Alkaloids | Dragendorf Reagent | - |
| 4. | Steroids | Lieberman-Burchard Reagent | + |
| 5. | Triterpenoids | | - |
| 6. | Saponnins | HCl + H ₂ O Reagent | + |
| 7. | Tannins | FeCl ₃ 1% Reagent | + |

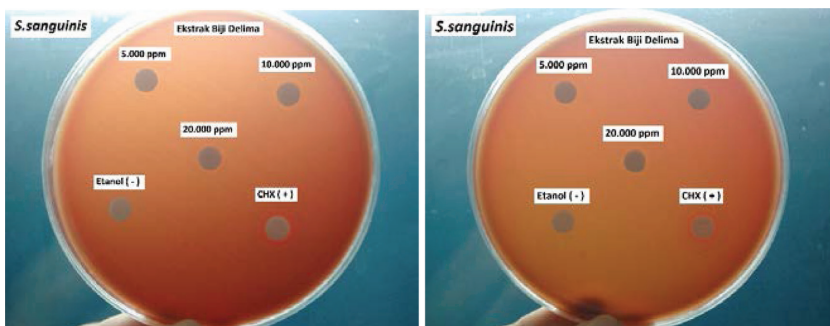


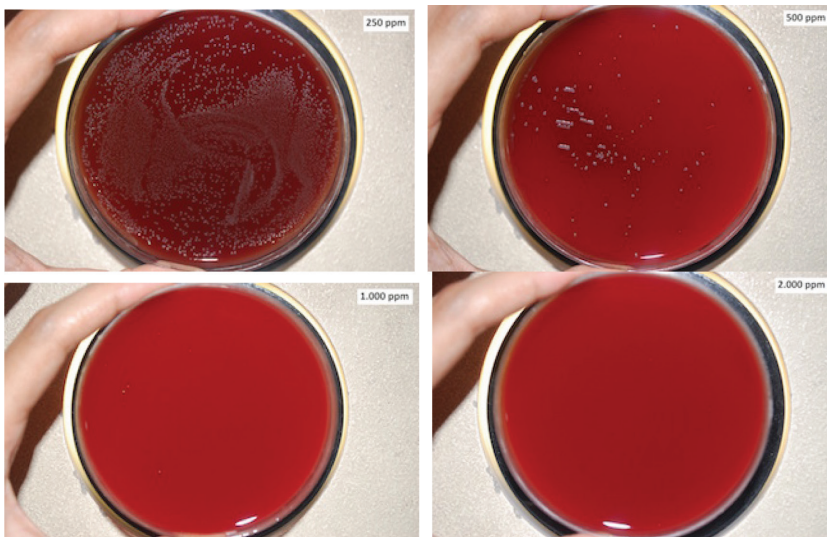
Figure 1 Antibacterial test analysis of Pomegranate seeds extract against *S. sanguis*

Table 2 Antibacterial test analysis of pomegranate seeds extract against *S. sanguis*

| No | Sample & Concentration (ppm) | Inhibitory Diameter, (d/mm) | D Average (mm) | | Note |
|----|---|-----------------------------|----------------|-------|-------------|
| 1 | Punica granatum L. Seed Extract (20.000) | 8.40 | 8.15 | 8.28 | Active |
| 2 | Punica granatum L. Seed Extract (10.000) | 8.10 | 8.70 | 8.40 | Active |
| 3 | Punica granatum L. Seed Extract (5.000) | 8.10 | 7.80 | 7.95 | Active |
| 4 | Control Negative: Ethanol solventPositive | - | - | - | Not Active |
| 5 | Control: Chlorhexidine (2.000) | 11.30 | 11.40 | 11.35 | Susceptible |

Table 3 MIC analysis of pomegranate seeds extract against *S. sanguis*

| Well | Concentration (ppm) | | | | | | | | | | | |
|----------------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 8.000 | 4.000 | 2.000 | 1.000 | 500 | 250 | 125 | 62,5 | 31,25 | 15,63 | 3,81 | 3,91 |
| Media + Sample | 0.712 | 1.703 | 1.178 | 0.849 | 0.559 | 0.324 | 0.183 | 0.107 | 0.072 | 0.056 | 0.051 | 0.045 |
| | 0.574 | 1.237 | 1.013 | 0.601 | 0.368 | 0.218 | 0.134 | 0.084 | 0.061 | 0.051 | 0.045 | 0.043 |
| Media + Solvent | 0.042 | 0.039 | 0.038 | 0.041 | 0.040 | 0.042 | 0.040 | 0.040 | 0.040 | 0.043 | 0.041 | 0.041 |
| | 0.043 | 0.038 | 0.038 | 0.041 | 0.040 | 0.041 | 0.041 | 0.043 | 0.043 | 0.043 | 0.041 | 0.040 |
| Media + Sample + Bacteria | 0.623 | 1.045 | 0.890 | 0.596 | 0.367 | 0.216 | 0.134 | 0.100 | 0.095 | 0.092 | 0.083 | 0.079 |
| | 0.656 | 0.737 | 0.890 | 0.658 | 0.410 | 0.250 | 0.151 | 0.112 | 0.106 | 0.094 | 0.086 | 0.074 |
| Media + Solvent + Bacteria | 0.043 | 0.042 | 0.042 | 0.043 | 0.047 | 0.087 | 0.115 | 0.111 | 0.105 | 0.108 | 0.110 | 0.109 |
| | 0.045 | 0.044 | 0.044 | 0.046 | 0.047 | 0.084 | 0.095 | 0.105 | 0.101 | 0.106 | 0.110 | 0.107 |

**Figure 2** MBC value of pomegranate seeds extract against *S. sanguis*

7 and 8. Dilution carried out in stages, starting from the concentration of 32.000 ppm.

In table 3, along with the decrease in extract's concentration by the multiple of $\frac{1}{2}$, there was a growing in the number of bacteria at the concentration of 250 ppm for wells consisting of media and sample. This condition provides that the value of MIC was before the concentration of 250 ppm, i.e. at concentration of 500 ppm. Wells consisting of *S. sanguis* in media and solvent showed that there was *S. sanguis* growth at the concentration of 1000 ppm,

it gave information that solvent had influence in *S. sanguis* growth inhibition by MIC 2000 ppm.

Figure 2 the MBC determination test of Pomegranate seeds extract against *S. sanguis* showed there was still a growing of bacterial colonies at the concentration of 250, 500 and 1000 ppm, whilst in the subsequent concentration (2000 ppm) found no bacterial growth. It could be determined that MBC for pomegranate seeds extract against *S. sanguis* was on the value of 2000 ppm table 2.

Discussion

The important phytochemical test was conducted after the maceration process with 70% ethanol and pomegranate seeds extract were obtained. It is necessary to identify the content of the extract. The phytochemical screening results proved that pomegranate seeds extract contains of phenolics, flavonoids, steroids, saponins and tannins. The phenolics and flavonoids group have been known of its antibacterial activity. The former study stated that antimicrobial activity from 6 variety Pomegranate were correlated with the respond of phytonutrient substance, such as total phenolics and anthocyanins compound.^{8,9}

Phytochemical screening of pomegranate peel and leaf indicated alkaloids, tannins, sterol, volatile oil, carbohydrate, flavonoids, glycosid, resin, balsams, terpenes and Free-Reducing Sugar but

saponins was undetectable. The content of these metabolites substances showed great potential as medicinal plant.^{10,11}

The result of phytochemical test pomegranate seeds extract as a guide to do the next test i.e the test for *S. sanguis* inhibition. The phenolics and flavonoids group have been known to have antibacterial activity, that is why the result of phytochemical test could support if there were antibacterial properties during inhibition test (disk diffusion), MIC and MBC.^{12,13} MIC of an antimicrobial extract was determined using broth serial dilution technique as was done in this study, antimicrobial substance was diluted several times using tube test contained of nutrient compound and then reacted with the pathogenic bacteria. The tube test then incubated, the growth of pathogenic bacteria was detected using spectrophotometer 600 nm. Concentration on the tube test which showed the bacterial growth increases dramatically expressed as MIC.¹⁴

The result of this study showed that MIC of pomegranate seeds extract was 500 ppm while MIC for media and solvent was 2000 ppm. It indicated that MIC value of pomegranate seeds extract was better and if the evaporation stage in maceration process had successfully vaporized the whole 70% ethanol as a solvent, the only remaining substance was active compound or thick extract. Even though if there was still little substance was left and carried out, the effect was not expected to change the MIC value which was obtained significantly.

Vasconcelos et al.¹⁵ stated that pomegranate peel extract can be used to control adherence of different microorganisms in the oral cavity. MIC of adherence of pomegranate gel against *S. mutans* and *S. sanguis* were 1:16, 1:128 for *S. mitis* and 1:64 for *C. albicans*.¹⁵ MIC adherence of pomegranate gel against *S. mitis* (1:512), *S. mutans* (1:256), *S. sanguis* (1:128) and *C. albicans* (1:4).¹⁶

There were differences between the MIC against *S. sanguis* then MIC was 500 ppm the MIC was 1:16 (62.500 ppm) and 1:128 (7800 ppm) respectively. These differences occur because the pomegranate extract used in this study was derived from the seeds. The result of this study indicated that MIC of pomegranate seeds extract was better than peel's extract.

The value of the lowest concentration of pomegranate seeds extract was known, could inhibit the growth of *S. sanguis* bacteria MIC. The next step was determining the MBC value. MBC is the lowest concentration of an antimicrobial that will prevent the growth of organisms in a culture broth.¹⁶ The determination test for MBC value of pomegranate seeds extract indicated that at the concentration of 250, 500 and 1000 ppm there were still bacterial colonies growth, while at the subsequent concentration of 2000 ppm no growth of colony bacteria, thus MBC value for pomegranate seeds extract sample against *S. sanguis* was at the value of 2000 ppm.

Conclusion

Pomegranate seeds extract has proven containing phenolics, flavonoids, steroids, saponins and tannins at phytochemical test and has bacteriostatic activity against *S. sanguis* with 500 ppm as MIC value and bactericidal MBC at the concentration of 2000 ppm.

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Conflict of Interest

The authors report no conflict of interest.

References

1. Jurenka, J. Therapeutic applications of Pomegranate (*Punica granatum* L.): A Review. *Altern Med Rev* 2008;13: 128-131.
2. Jozinete VP, Maria SVP, Fábio CS, et al. In vitro antibacterial and antiadherence effect of *Punica Granatum* linn extract upon dental Biofilm microorganisms. *Rev Braz Farmacogn* 2006;16: 88-93.
3. Greenberg M, Ulcerative, Vesicular, et al. *Burket's Oral Medicine*. 10th ed. Spain: BC Decker; 2003. p. 63-65.
4. Field A, Lesley L, William RT. *Tyldesley's Oral Medicine*. 5th ed. Oxford: Oxford University Press; 2004. p. 49-60.

5. Preeti L, Magesh KT, Rajkumar K, et al. Recurrent Aphthous Stomatitis. *J Oral Maxillofac Pathol* 2011;15: 252-256.
6. Scully C, Porter S. *Orofacial disease*. 1st ed. Edinburgh: Churchill Livingstone; 2003. p. 13-15.
7. Scully C. *Oral and Maxillofacial medicine the basis of diagnosis and treatment*. 2nd ed. Edinburgh: Churchill Livingstone Elsevier; 2008. p. 12.
8. Anibal PC, Peixoto ITA, Foglio MA, et al. Antifungal activity of the Ethanolic extracts of Punica Granatum L and evaluation of the Morphological and structural modifications of its compounds upon the cells of Candida sp. *Braz J Microbiol* 2013;44: 839-848.
9. Duman AD, Ozgen M, Dayisoğlu KS, et al. Antimicrobial activity of six Pomegranate (Punica granatum L.) varieties and their relation to some of their Pomological and Phytonutrient characteristics. *Molecules* 2009;14: 1808-1817.
10. Egharevba, Omoregie H, Kunle et al. Phytochemical analysis and antimicrobial activity of Punica Granatum L. (fruit bark and leaves) *N Y Sci J* 2010;12: 3.
11. Abdollahzadeh Sh, Mashouf RY, Mortazavi H, et al. Antibacterial and antifungal activities of Punica Granatum Peel extracts against Oral Pathogens. *J Dent (Tehran)* 2011;8: 1-6.
12. Saravanakumar A. Evaluation of antibacterial activity Phenol and flavonoid contents of the Spesiapulnea flower extracts. *Pak J Pharm Sci* 2013;22: 283-286.
13. Karamian R, Ghasemlou F. Screening of total phenol and flavonoid content, antioxidant and antibacterial activities of the Methanolic extracts of three Silene species from Iran. *IJACS* 2013;5: 305-312.
14. Hanee S, Khan JA. Antibacterial properties of Punica granatum Peel. *Int J Appl Biol Pharm* 2011;2: 23-27.
15. Vasconcelos LCD, Sampaio FC, Sampaio MCC, et al. Minimum inhibitory concentration of adherence of Punica granatum Linn (Pomegranate) gel against *S. Mutans*, *S. Mitis* and *C. Albicans*. *Braz Dent J* 2006;17: 223-227.
16. Andrews JM. Determination of minimum inhibitory concentrations. *J Antimicrob Chemother* 2001;48: 5-16.



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The prevalence of Xerostomia after doing radiation therapy in patients with head and neck cancer



CrossMark

Barunawaty Yunus*

Abstract

Objective: To investigate the prevalence of xerostomia after radiation therapy in patients with cancer in head and neck area.

Material and Methods: The subjects of this study were patients with cancer in head and neck area who underwent radiotherapy treatment at Hasanuddin University teaching hospital, subjects were then taken saliva before and after given a total dose of 20 Gy and a total dose of

40 Gy. The analysis of the data processed by the computer program and the Wilcoxon test significance level is accepted when $p < 0.05$.

Results: The mean bulk saliva before radiotherapy was higher than average of saliva secretion after radiotherapy total dose of 20 Gy and 40 Gy.

Conclusion: A total dose of radiation therapy of 20 Gy and 40 Gy may reduce the secretion of saliva in patients with cancer in head and neck area.

Keywords : Radiotherapy, Head and neck cancer, Xerostomia, The bulk of saliva

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Introduction

Development of the use of X-rays increased comprehensively after X-rays discovered by Wilhelm Conrad Rontgen in 1895, both in the fields of industry, health sector includes the field of dentistry. In the health field, radiation is used as a diagnostic and therapeutic tool. The use of radiation therapy is called radiotherapy as one of the therapies to treat cancer.^{1,2}

Cancer therapy has three basic treatments: surgery, radiotherapy and chemotherapy. Radiotherapy is increasingly being used as primary therapy in the treatment of head and neck cancer. Radiotherapy uses high-energy particles or waves such as gamma rays, electron beams, photons, protons and neutrons to destroy the DNA of cancer cells so it cannot grow and divide again.^{2,3}

Radiotherapy also have some effects in the oral cavity. The effects can be acute effects in the oral soft tissue such as mucositis, xerostomia, secondary infections and chronic effects in the hard tissue such as osteoradionecrosis and caries. These complications can be temporary.⁴

Xerostomia is one side effect of radiation therapy which are most common affect the head and neck. This situation is a symptom and not a disease, which is generally associated with reduced saliva. For patients this situation is not pleasant so are the dentists where they consider it as a difficult problem. Therefore, it is important for dentists to be aware of the problem of xerostomia as a side effect of radiation therapy, accordingly appropriate treatment can be done to minimize the side effects of radiation therapy. In patients with carcinoma of the neck and

the head, radiation therapy is often done so that the salivary glands are often affected in a radiation field that causes interference with the function of the salivary glands, resulting in xerostomia.⁵

An estimated 30% of patients aged 65 years above who suffer from this disorder. Xerostomia which is caused by a medication is the most common disorder, because most elderly patients must have experienced of the treatment that uses drugs that can cause salivary hypofunction. The prevalence of xerostomia increased to 60% in patients living with long-term treatment, such as in patients using psychiatric drugs, anti-hypertensive or renal disease.⁵

Seeing this report, the researchers wanted to see the prevalence of xerostomia in patients with head and neck cancer who got radiation treatment.

Material and Methods

This study included within the scope of Dental and Oral Pathology as well as Radiation Oncology. The study took a place at Dental Hospital, Department of Radiotherapy, Hasanuddin University from June to September 2015. Based on the objectives to be achieved, then the type of research used in this study was a quasi-experimental design with pre-test and post-test design. The subjects of this study were patients with head and neck cancer area undergoing radiotherapy treatment in the area of head and neck radiotherapy Installation at Hasanuddin University from June to September 2015.

Subjects were selected with consecutive sampling method. Materials used in this study were saliva, gauze and alcohol 70% and some tools

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Table 1 Distribution of the sample according to age group

| Age (year) | Amount | % |
|------------|--------|-----|
| 21 – 40 | 4 | 40 |
| 41 – 60 | 3 | 30 |
| 61-80 | 3 | 30 |
| Total | 10 | 100 |

Table 2 Distribution of the sample by gender

| Sex | Amount | % |
|--------|--------|-----|
| Male | 8 | 80 |
| Female | 2 | 20 |
| Total | 10 | 100 |

Table 3 Results of saliva bulk ratings

| Curah Saliva | Mean (ml) | Std. Deviation (ml) |
|--|-----------|---------------------|
| Bulk of saliva before radiotherapy | 1.96 | 0.09 |
| Bulk of saliva after radiotherapy total dose 20 Gy | 0.97 | 0.06 |
| Bulk of saliva after radiotherapy total dose 40 Gy | 0.53 | 0.08 |

Table 4 Results of test calculations normality of data

| Bulk of Saliva | P |
|------------------|--------|
| Bulk of Saliva 1 | 0.245* |
| Bulk of Saliva 2 | 0.015 |
| Bulk of Saliva 3 | 0.045 |

*) Normal distribution of data, $p > 0.05$
 $p < 0.05$ can be concluded that the data distribution is not normal.

Table 5 The result of the calculation of non-parametric statistical analysis of friedman test

| Bulk of Saliva | P |
|------------------|-------|
| Bulk of Saliva 1 | 3.00* |
| Bulk of Saliva 2 | 2.00* |
| Bulk of Saliva 3 | 1.00* |

*) Normal distribution of data, $p > 0.05$

Table 6 Saliva secretion in three different condition

| Saliva collected | I | II | III |
|------------------|--------|--------|--------|
| Saliva secretion | 0.005* | 0.004* | 0.005* |

* $p < 0.005$; Wilcoxon rank-sum test

in the form of saliva container, rod stirrer and a measuring cup. Before the study, researchers asked permission to conduct research to patients who met the inclusion criteria then explained that they would be included in this study and asked their willingness to participate in the study.

Patients were given the explanation that the saliva output would be measured. Then intervention in accordance with the flow of research was done. Subject bows her head in deep and perform one movement to eliminate the swallowing of saliva collected before the time of calculation. Subject let the saliva in his mouth flow through the lower lip into the measuring tube and the end time of the collection of the subject spit out the rest of the saliva did not flow into the tube. Those processes were done 3 times with different doses for either before and after radiotherapy. Before radiotherapy the total dose was 20 Gy and after radiotherapy the total dose taken was 40 Gy .

Results

This study was conducted for four months to the patients who were already registered to undergo radiotherapy treatment of head and neck area in the Dental Hospital, Department of Radiotherapy, Hasanuddin University. Samples were taken by consecutive sampling where all patients who met the inclusion criteria included in the study until the required sample size was met till finally 10 samples were obtained in the study.

The youngest age in the study was 30 years old, while the oldest was 63 years of age. Of the 10 samples of the study, the largest age group was 21-40 years old consisted of 4 samples.

In this study, the number of samples with the male sex more than women samples.

Table 3 shows that the average rainfall saliva before radiotherapy was higher than average rainfall saliva after radiotherapy total dose of 20 Gy and 40 Gy. It also explains that the more the total dose of radiotherapy, the rainfall will decrease saliva.

Test of distribution normality of data was conducted to determine the condition of the distribution of research data. Since there were not normally distributed data, then a statistical analysis of non-parametric friedman test was used.

Seeing the value of $p > 0.05$ in all three groups, it can be concluded that the data were normally distributed.

Wilcoxon test resulted in the significant value of 0.005 in bulk saliva I, the bulk saliva 2 of 0.004 and the bulk of salivary 3 significance value of 0.005. From these results, the significant value of the three groups of saliva bulk of $p < 0.05$, it can be concluded that there is a significant difference between the bulk saliva before radiotherapy, salivary output after a dose of 20 Gy and 40 Gy dose of bulk saliva after therapy, further there was a decrease in rainfall of saliva in patients undergoing radiotherapy of the head and neck area.

Discussion

This study was conducted to 10 patients undergoing radiotherapy treatment in head and neck area at Dental Hospital, Department of Radiotherapy, Hasanuddin University from June to September 2015. The collection of saliva from 10 samples before radiotherapy results obtained minimum and maximum yield 2.1 ml 1.8 ml after radiotherapy dose a total of 20 Gy the results obtained minimum and maximum yield 1.1 ml, 0.9 ml, after a total dose of 40 Gy radiotherapy results obtained minimum and maximum yield 0.7 ml, 0.4 ml. The results of data analysis showed the average rainfall saliva before patients undergo radiotherapy treatment was 1.96 ± 0.09 , the average rainfall saliva after a total dose of 20 Gy radiotherapy was 0.97 ± 0.06 and the mean bulk saliva after a total dose of 40 Gy radiotherapy is 0.53 ± 0.08 .

According to research conducted by Agustin⁶ that the results of research conducted on 10 patients consisted of 5 women and 5 men in Yogyakarta at RS.DR.Sardjito, Radiology Unit shows that there are differences in salivary output in patients radiotherapy head area and neck either before or after radiotherapy.⁶ Study to 10 patients in the radiotherapy unit RS. Dr. Kariadi, Semarang showed that there is a significant decrease in salivary output in patients with head and neck radiotherapy area.⁷

Decrease in rainfall of saliva in this study because the area of head and neck radiotherapy involving the salivary glands in the area of radiation that can cause damage to cells of the salivary gland secretion.⁸ salivary pH will decrease as salivary flow also decreased.⁹

In the next phase, the characteristics of the salivary glands was replaced by remnants of the duct and connective tissue filled with lymphocytes and plasma cells. Progressive glandular atrophy, fibrosis and reduced expenditure saliva begins immediately after the initial radiation exposure and intensive exposure afterward.¹⁰

Although the salivary glands do mitotic slowly, salivary gland is a gland that radiosensitive. Acini of salivary gland is the most radiosensitive where the parotid gland serous acini more radiosensitive than acini mukous submandibular and sublingual glands.¹⁰

Patients who received radiotherapy treatment of head and neck area experienced a significant increase in the form of saliva concentrations of sodium, chlorine, calcium, magnesium and protein accompanied by a decrease in spending (flow rate) and decreased in salivary bicarbonate concentrations. Salivary bicarbonate buffer system is very important to against acid formation by dental plaque, but only in high concentrations. Increased bicarbonate concentration resulted in an increase in the pH of saliva.

As a result of the reduced concentration of bicarbonate, xerostomia sufferers will have a low salivary pH and low capacity screening. These changes make saliva contains a higher salt and expenditure salivary secretion is also worse in patients with xerostomia compared with saliva in normal people.¹⁰

Conclusion

Radiotherapy of the head and neck area total dose 20 Gy and 40 Gy may affect rainfall saliva. There are differences between the bulk saliva before radiotherapy with bulk saliva after radiotherapy total dose of 20 Gy, bulk saliva before radiotherapy with bulk saliva after radiotherapy total dose of 40 Gy and the bulk of saliva after radiotherapy total dose of 20 Gy to bulk saliva after radiotherapy total dose of 40 Gy. People who undergo radiation therapy, especially cancer of head and neck area prone to symptoms of xerostomia due to reduced secretion of saliva during the therapy process.

Conflict of Interest

The authors report no conflict of interest.

References

1. Rasad S. Radiologi diagnostik. 2nd ed. Jakarta: Balai Penerbit FKUI; 2010. p. 1- 26.
2. Burket LW, Greenberg MS, Glick M, et al. Oral cancer. In: Epstein J, Wall IVD. Editors. Burket's oral medicine: diagnosis and treatment. 10th ed. Philadelphia: J.B.Lippincott Co; 2008. p. 194-226.
3. Susworo R. Radioterapi : dasar-dasar radioterapi dan tata laksana radioterapi penyakit kanker. Jakarta: Penerbit Universitas Indonesia; 2007. p. 1-78.
4. Moller PPM, Ozsahin M, Monnier P. A prospective study of salivary gland function in patient undergoing radiotherapy for squamous cell Carcinoma of the Oropharynx. 2004 [cited 2011 Dec 11]; Available from: <http://www.ncbi.nlm.nih.gov/pubmed/14970776>.
5. Rini E. Xerostomia sebagai salah satu efek samping terapi radiasi. USU e-Repository 2005.
6. Agustin RN. Pengaruh radioterapi area kepala dan leher terhadap perbedaan Curah Saliva pria dan wanita. Yogyakarta: Fakultas Kedokteran Gigi Universitas Gadjah Mada; 2006.
7. Fithrony M. Pengaruh radioterapi area kepala dan leher terhadap Curah Saliva. Semarang: Universitas Diponegoro; 2012.
8. Meidyawati R. Pengaruh radiasi dosis terapi terhadap kekerasan email yang dilapisi Varnish Fluor. Jakarta: Indonesia University; 2003.
9. Amerongen AVN. Ludah dan kelenjar ludah: arti bagi kesehatan gigi. Yogyakarta: Gadjah Mada University Pers. p. 1-39.
10. Andrews N, Griffiths C. Dental Complications of Head and Neck Radiotherapy: Part 1. Aust Dent J. 2001;46: 88-94.



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The effects of rinsing red beet root (*Beta vulgaris* L.) juice on streptococcus sp. dental plaque



CrossMark

Dyah Setyorini,^{1*} Yani C. Rahayu,² Tita Sistyaningrum¹

Abstract

Objective: The aim of this study was examine the effectiveness of rinsing red beetroot juice to streptococcus sp. on dental plaque.

Material and Methods: Antiplaque have side effects, so it is necessary to do research of alternative antiplaque materials. One of them is the use of red beet root because it contains some antibacterial substances.

Results: Analysis of One-Way ANOVA have significance 0.000, which means it decreased the number of streptococcus sp.

Conclusion: Rinsing red beet root juice is effective to decrease the number of streptococcus sp. on dental plaque.

Keywords: Red beet root, Streptococcus sp, Dental plaque

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Introduction

Dental plaque is a biofilm contains of bacteria and firmly attach to tooth surface, restoration and prosthesis.¹ The early process of plaque formation is preceded by pellicle formed 1 minute after dental cleaning. The formation of pellicle is started by bacteria attachment dominated by streptococcus sp colony, continued by the attachment of the other microorganisms.² One of the many ways to eliminate plaque and obstruct the forming of plaque is doing plaque control. Mechanical plaque control can be done by brushing teeth and using dental floss.³ Chemical plaque control can be done with gargling antimicrobial solution. One of the antimicrobial materials is mouthwash.⁴ Plaque control only with mechanical way cannot give the best result, that is why another way is needed to control plaque, that is by the chemically way.⁵

Mouthwash is one of the solutions or liquid used for giving a freshness to oral cavity and cleaning it from plaque and organisms which can cause an illness in oral cavity. A mouthwash that is usually used and studied is chlorhexidine gluconate. Chlorhexidine gluconate is a large spectrum antibacterial.⁶ Chlorhexidine helps plaque clearance optimally but chlorhexidine has negative effects such as can cause stain in teeth, tongue and dentist materials, changing the sensation of taste, burn feeling in oral mucosal and a epithelial desquamation reaction.⁷ The negative effects of mechanical contained in mouthwash encourage the researcher to do a research about alternative material which meets the criteria of safer antiplaque materials, one of them is red beet root. Red beet root is a safe material because it is usually

consumed as a vegetable and has lots of benefits for human body.^{8,9}

Red beet root has antibacterial activity towards gram positive and gram negative bacteria. The highest antibacterial activity in red beet is towards gram positive bacteria. Beet has an antibacterial activity because it contains phenol. The other content of red beet antibacterial are flavonoids, tannins and saponins.¹⁰

Material and Methods

This quasi experimental study used post-test only control group design. This study was carried out in Laboratory of Microbiology Faculty of Dentistry, Laboratory of Microbiology and Laboratory of Botany Faculty of Mathematics and Natural Science University of Jember, Jember, Indonesia. This study passed ethical approval by Medical Research Ethic Committee of University of Jember as stated in the letter No.1072/H25.1.11/KE/2016.

The subjects were 27 students of Dentistry Faculty University of Jember, Jember, Indonesia chosen by purposive sampling. The subjects were divided into 3 groups, group 1 was rinsing with aquadest, group 2 was rinsing with chlorhexidine gluconate 0.2% and group 3 was rinsing with red beet root juice. All subjects were given the instruction of how to rinse, scaling was done one week before the research, instructed to use the same technique of brushing their teeth which was roll technique, asked not to use any mouthwash during study, instructed not to eat and drink one hour before the study and did a standard-ize which was rinsing using aquadest for each group.

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The study done in the Laboratory of Microbiology Faculty of Dentistry University of Jember, Jember, Indonesia at 09.30-10.00 WIB. The time was chosen to decrease the negative impact from circadian rhythm to the flow of saliva.¹¹ The first day group 1 was rinsing with aquadest, second day the group 2 was rinsing with chlorhexidine gluconate 0.2% and the third day group 3 was rinsing with red beet root juice. Each subjects rinsing about 15 ml solution in 30 seconds. After that, it was discarded and waited for 5 minutes and continued with plaque sampling on the buccal surface of the maxillary first molar tooth about 3 times using excavator from mesial to distal, then it went inside of a test tube containing of 2 ml PZ solution. Then, the plaque sample diluted in 10^{-3} dilution. After diluted, the plaque sample planted in streptococcus jelly medium using pour plate method, then incubated for 24 hours at 37°C. The inoculation result of streptococcus sp were counted using a colony counter.

Results

Study results the number of colonies of streptococcus sp. as much as 174.7×10^3 CFU/ml, rinsing group used chlorhexidine gluconate 0.2% have a number of colonies of streptococcus sp.

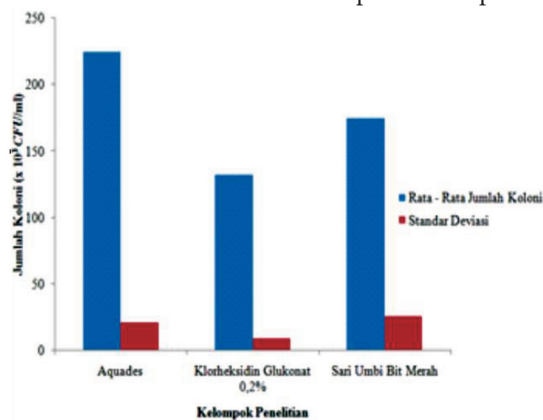


Figure 1 Histogram of the average number of streptococcus sp. in each group

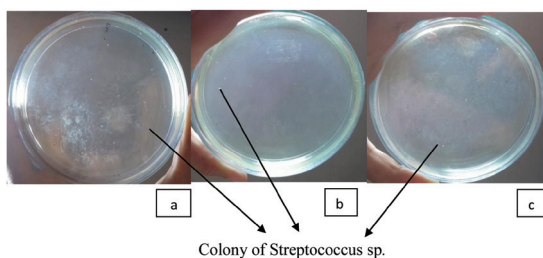


Figure 2 The results of inoculation of streptococcus sp. in rinsing group A. Aquadest, B. Chlorhexidine gluconate 0.2%, C. Extract of beet root

as much as 132.1×10^3 CFU/ml and the number of colonies group that rinsing with aquadest was 224.4×10^3 CFU/ml. The average results on the number of colonies of streptococcus sp. each group obtained histogram that can be seen in [figure 1](#).

The fewest number of streptococcus sp. colonies were the rinsing group with chlorhexidine gluconate 0.2% [figure 2b](#), followed by rinsing group used the extract of red beet root [figure 2c](#) and the number of colonies, mostly were in groups rinse aquadest [figure 2a](#). It can be interpreted that the most decreased number in colony of streptococcus sp. was occurred in the group gargling with chlorhexidine gluconate 0.2%, followed by gargling group was the extract of red beet bulb and the latter were group aquadest rinse.

The results of One-Way ANOVA test was obtained significance value of 0 which means less than 0.05. Based on the significant value it can be interpreted that there are differences in the number of colonies of streptococcus sp. significance due to material different mouthwash. Test followed by LSD (Least Significance Different) determined significant difference in all groups.

Discussion

The results showed that the decrease in the number of colonies of streptococcus sp. In other hand the largest plaque occurred in the positive control group was the group rinsed with chlorhexidine gluconate 0.2% group as much as 132.1×10^3 CFU/ml, followed by a group of red beet root juice as much as 174.7×10^3 CFU/ml and the number of colonies by aquadest group was 224.4×10^3 CFU/ml.

Positive control in this study was 0.2% of chlorhexidine gluconate having the ability to reduce the number of colonies of streptococcus sp. in plaque. Chlorhexidine is a mouthwash that has a broad spectrum against positive and negative gram bacteria. Chlorhexidine has bactericidal characteristic with strong binding mechanism to the bacterial cell membrane, increasing cell permeability, thus starting bacterial leakage of intracellular components.⁶ Chlorhexidine resulted in coagulation and precipitation of cytoplasm with the formation of phosphate complexes that include adenosine triphosphate (ATP) and nucleic acids that resulted in cell death. The antimicrobial effects of chlorhexidine is caused by presence of absorption dicationic molecules to the surface of the oral cavity, email, or pellicle.^{12,13}

Chlorhexidine has a big antibacterial characteristic. Further, chlorhexidine can help the removal of plaque optimally, however it also has side effects, such as stain in teeth, tongue and materials-dental,

can cause changing in the sensation of taste, burning sensation in the oral mucosa and the occurrence of epithelial desquamation reaction.⁷ The use of chlorhexidine gluconate 0.2% in the study resulted in the loss of sensation shortly after gargling by using chlorhexidine gluconate 0.2%.

Red beet root juice extract in this study can reduce the number of streptococcus sp. in plaque. The red beet root are known contain a number of antimicrobial compounds such as phenols, flavonoids, alkaloids, tannins and saponins.⁹ The content of the antibacterial in the red beet root is assumed to decrease the number of colonies of streptococcus sp. in plaque. Phenol in red beet roots have high antimicrobial activity. The mechanism of phenol as an antibacterial giving an effect on the bacterial cell membrane, changing the cell membrane and changing the structure of the membrane, thereby increasing the permeability of the cytoplasmic membrane. The increased of permeability of the cytoplasmic membrane resulted in the loss of cellular pH gradient, decreased levels of ATP and the loss of the proton motiveforce, which causes cell death.¹⁰

The mechanism of flavonoids as antimicrobial is to create a bond with phospholipids in the cell membrane of bacteria by reducing the permeability of the membrane, hence the cells become lysis and cause denaturation of proteins, inhibiting the formation of cytoplasmic proteins, nucleic acids and bonding with ATP-ase in the cell. The damage from cell membrane results in leakage of critical components such as proteins, nucleic acids and nucleotides which are the result of cell permeability disturbance so the cells unable do the activities of life and stunted growth or even death.¹⁴

The red beet root contains tannins that has antibacterial properties. The mechanism of tannins antibacterial is through reaction with the cell membrane, inactivation of the enzyme and inactivation of the function of the genetic material. The mechanism of tannins as antibacterial agent are inhibiting the enzyme reverse transcriptase and DNA topoisomerase so bacterial cells cannot be formed. The power of tuber red beet antibacterial is saponins. The mechanism of saponins as an antibacterial which can cause leakage of proteins and enzymes from cells. Saponins can be used as an anti-bacterial because its surface as an active substances like detergents, consequently saponins will reduce the surface tension of the wall of bacterial cell and damage membrane permeability.¹⁵

Conclusion

The conclusions of this study is rinsing with red beet root juice effectively decreases the number of colonies of streptococcus sp. in dental plaque. The content of phenols, flavonoids, tannins and saponins in red beet root suspected of having a function as an antibacterial.

Conflict of Interest

The authors report no conflict of interest.

References

- Nield-Gehring JS, Willman DE. Foundation of periodontics for the dental hygienist. 3rd ed. Philadelphia: Wolters Kluwer Health; 2011.
- Newman MG, Takei HH, Klokkevold PR, et al. Carranza's clinical periodontology. 11th ed. China: Saunders Elsevier; 2012.
- Natamiharja L, Dewi O. Perbandingan penurunan indeks plak sebelum dan sesudah menyikat gigi antara kelompok sikat gigi dengan bulu sikat gigi lurus dan zig zag di 3 sekolah dasar. Journal of Dentistry University of Indonesia 1998;5: 109-116.
- Loe H. Oral hygiene in the prevention of caries and periodontal disease. IDJ 2000;50: 129-139.
- Merveryano J, Rahmatin, Bahar E. Perbandingan efektivitas obat kumur yang mengandung chlorhexidine dengan povidone iodine terhadap streptococcus mutans. Jurnal Kesehatan Andalas 2015;4: 168-171.
- Asadoorian J. Oral rinsing. CJDH 2006;40: 168-183.
- Hepse HU, Bjerland T, Skoglund LA. Side Effect of 0.2% Versus 0.1% Chlorhexidine used as Post-operative Prophylactic mouthwash. Int J Oral Maxillofac Surg 1988;17: 17-20.
- Yashwant K. Beetroot: A Super Food. IJESTA 2015;1: 20-26.
- Kezi J, JH Sumathy. Betalain-a boon to the food industry. Discov 2014;20: 51-58.
- Canadanovic-Brunet JM, Savatovic SS, Cetkovic GS, et al. Antioxidant and antimicrobial activities of beet root pomace extracts. Czech J Food Sci 2011;29: 575-585.
- Leonor SP, Laura SM, Esther IC, et al. Stimulated saliva flow rate patterns in children: A six-year longitudinal study. Arch Oral Biol 2009;54: 970-975.
- Balagopal S, Arjunkumar R. Chlorhexidine: the gold standard antiplaque agent. J Pharm Sci Res [internet]. 2013 [cited 2017 Jan 01];5(12):270-4. Available from: <http://pharmainfo.in/jpsr/Documents/Volumes/vol5issue12/jpsr05121306.pdf>.
- Eley BM. Antibacterial agents in the control of supragingival plaque: a review. Br Dent J 1999;186: 286-296.
- Lestari IK, Nazip K, Estuningsih S. Test of effectiveness of antibacterial of Ethanol extract of Loranthus of Tea (*Scurullaatro purpurea* BL Danser) on the growth of enterobacter sakazakii. International conference on Food, Biological and Medical Sciences (FBMS-2014). Jan 2014 [cited 2017 Jan 04]: (pp. 28-29). Available from: <http://iicbe.org/upload/5140C0114552.pdf>
- Rijayanti RP. Uji aktivitas antibakteri ekstrak etanol daun mangga bacang (*Mangifera Foetida* L.) terhadap *Staphylococcus aureus* secara in vitro. Jurnal Mahasiswa PSPD FK Universitas Tanjungpura 2014: 1.



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Association between duration of residence with gingival pigmentation in Nuha District, East Luwu Regency, South Sulawesi, Indonesia



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Abstract

Objective: Gingival Pigmentation (GP) is change of gingival color caused by deposition of pigment or other tissue-colorizing substances. Normal color of gingival tissue sometimes termed “coral pink” or “salmon pink”. The change of gingival color from brownish to black could result in medical and/or aesthetical problems. This study proposed to determine the association between duration of residence with gingival pigmentation to the community of Nuha District of East Luwu society. This study as a descriptive observational with cross-sectional study design.

Material and Methods: The population in this study was all of the Nuha residents. The sampling technique used was simple. Gingival

pigmentation in this study was measured using Dummet Oral Pigmentation Index (DOPI).

Results: The data obtained showed significant association between duration of residence with maxillar and mandibular gingival pigmentation in the residents of Nuha District of Luwu Timur. p-value for maxillar DOPI was 0.003 and for mandibular DOPI was 0.000.

Conclusion: Duration of residence in a Nuha District, Luwu Timur Regency, South Sulawesi shows significant association with severity of gingival pigmentation among the residents. Such duration that represents the duration of exposure and accumulated amount of exposure.

Keywords: Duration of residence, Gingival pigmentation

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Introduction

Gingival Pigmentation (GP) is change of gingival color caused by deposition of pigment or other tissue-colorizing substances. Normal color of gingival tissue sometimes termed “coral pink” or “salmon pink”. The change of gingival color from brownish to black could result in medical and/or aesthetical problems. Patients often complain about darkened gingival mucosa. Such complains may have varying degrees and may result from physiological or pathological process from either endogenous factors, exogenous or both.^{1,2}

One of the endogenous factors of GP is increased melanin production by melanocyte-dendritic cells in basal epithelial tissue.³ In the other hand, exogenous factor of GP is related to incorporation of foreign substances into the tissue. Sources of these external substances may be the result of some behavior, such as gingival tattoo, medication and smoking, etc.¹

Heavy metal exposure such as lead, bismuth, mercury, silver arsenic and gold, can be detected from elevated blood concentration and has also been known as the cause of discoloration of oral mucosa.⁴ Elevated heavy metal concentration in the water, air and food sources causes significant effect on human health.⁵ Exposure can be detected in several organs in the body, including tissues

such as teeth, periodontal, lips, tongue, mucosal membrane, salivary gland and alveolar bone.⁶

In South Sulawesi Province, Luwu Timur Regency is one of many lands that have high concentration of naturally occurring heavy metals that attracts mining corporations. Previously extracted lands are often re-vegetated into agricultural sections.⁷ In spite of the good intention, these re-vegetation practices have been detrimental to the plants and animal living in the area since they are exposed to water and soil that has high heavy metal concentration.

Previous studies conducted in Luwu Timur Regency, specifically in Nuha District, has shown that heavy metal concentration is higher than acceptable limit in the grass that grows in the ex mines. When livestock living in that area are fed with such grass, the heavy metals may accumulate in their meat over time.⁸ Since humans also lives and consumes agricultural products from these lands, they are also prone to elevated concentration of heavy metal in their body.

Although physiological pigmentation may occur in the human body due to increased melanin production, external, non-physiological factors such as heavy metal absorption may precipitate in the vascular and sub-epithelial tissue.^{9,10}

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Heavy metal exposures on the oral tissue have been observed to have accumulative effect.¹¹ Hence, this present study was designed and conducted to determine the association of gingival pigmentation as a sign heavy metal exposure to duration of residence in people living in land containing high heavy metal level, such as the Nuha District, Luwu Timur Regency, South Sulawesi.

Material and Methods

This descriptive, observational study with cross-sectional design has been conducted in Nuha District, Luwu Timur Regency from September 30 - October 2, 2014. Among five villages in Nuha District, three villages were chosen from random-ization. The selected villages were Sorowako, Nikkel and Magani. Population of the subject was all of Nuha District residents which were sampled with two stage, simple cluster sampling. The number of subjects was 100 which was calculated using slovin formula:

$$\begin{aligned} n &= \frac{N}{1 + N\alpha^2} \\ &= \frac{23.429}{1 + (23.429 * 0,1^2)} \\ &= 99,58 \end{aligned}$$

Legend:

- n: number of sample subjects
- N: number of population
- e: error tolerance (%)

Inclusion and exclusion criteria

Inclusion criteria for the subjects were Nuha District residences of aged 12 years or older. Exclusion criteria were:

- Subjects that have smoking habit or had been having smoking habit
- Subjects that are or were in long term antibiotics medication
- Subjects that are or were using oral contraceptives
- Subjects that refuses to participate in the study

Operational definitions of the variables

Measured variables in this study were gingival pigmentation and duration of residence in Nuha District. Gingival pigmentation was measured as ordinal value and duration of residence was measured as nominal value.

- Causative variable:
Duration of residence was defined as the length of time spent living in Nuha District until the

time of study. This variable was measured in years.

- Effect variable:

Gingival pigmentation was defined as change of normal gingival color. Based on Dummet-Gupta Oral Pigmentation Index (DOPI), the discoloration ranges from light brown to bluish black. This range is quantified to allow categorization of its severity.

Assessment criteria

There are several variables that were measured with each of their assessment criteria.

- Gingival pigmentation

Gingival pigmentation was clinically assessed using dental mirror and the severity was assessed according to DOPI into several categories, such as mild, moderate and severe pigmentation. In either maxilla or mandible, was divided into 32 spatial units (16 units in palatal/lingual aspect, and 16 other in buccal/labial aspect). Each units is localized in their respective gingival area that extends from apical aspect for about 4-5 mm to gingival attachment. In the case of partial or total edentulous, these spatial units can still be used to assess the gingival since the assessment is independent of the presence of tooth.²

To allow categorization and quantification, each of the 32 units is assessed for pigmentation based on the scale below:

- o 0 = gingival color is pink → no clinical pigmentation
- o 1 = gingival color is pink-brown → mild clinical pigmentation
- o 2 = gingival color is light brown to brown → moderate clinical pigmentation
- o 3 = gingival color is dark brown to dark blue → severe clinical pigmentation

All gingival units was assessed with each of their corresponding numerical value and then summed and divided with 32. This final numbr is the DOPI. Each maxillar and mandibular DOPI are assessed independently. DOPI is categorized into:

- o 0.000 – 0.030: no gingival pigmentation
- o 0.031 – 0.970: mild gingival pigmentation
- o 1.000 – 1.900: moderate gingival pigmentation
- o 2.000 – 3.000: severe gingival pigmentation

- Duration of residence
Duration of residence among people of Nuha District is divided into 2 categories:
 - o Less than 10 years
 - o 10 years of more

This categorization is according to similar study that was analyzing the effect of work condition among battery factory workers in Germany.¹¹

Type of Data and Data Analysis

The data that were used in this study is primary data which were analyzed with Chi-square test.

Results

Table 1 shows average of gingival pigmentation expressed numerically as DOPI value based on characterization such as sex, age and duration of residence among the 100 sample subjects of Nuha District residents.

Among these samples, 89 of them (89%) were male and 11 (11%) were female. The result showed that average of DOPI among male was higher than of female. The average for the male was 0.56 with deviation standard (SD) of 0.51 for the maxilla and 0.33 with SD of 0.31 for mandible. For the female, the average was 0.38 with deviation standard (SD) of 0.28 for the maxilla and 0.32 with SD of 0.23 for mandible.

Age group categorization was according to Indonesian Ministry of Health. Among 100 subjects, the group that had most subjects is 26-35 years old. The age group that had highest average of DOPI value was the 46-55 years old, which was 0.91 for maxilla and 0.66 for mandible. Meanwhile, lowest average of DOPI value for maxilla was the 12-16 years old which was 0.30 (SD 0.06). For mandible the lowest average of DOPI value was the 17-25 years old which was 0.30 (SD 0.27).

Based on duration of residence, most subjects (72%) have been living in Nuha District for at least 10 years. Average DOPI value for residents living at least 10 years in Nuha District was higher than of those whom had been living less than 10 years. For subjects with at least 10 years of residential duration, average of maxillar DOPI value was 0.44 (SD 0.32) and average of mandibular DOPI value was 0.36 (SD 0.24).

For subjects with less than 10 years of residential duration, average of maxillar DOPI value was 0.29 (SD 0.29) and average of mandibular DOPI value was 0.22 (SD 0.32).

Table 2 shows distribution of severity of maxillar and mandibular gingival pigmentation expressed as DOPI value based on characterization such as sex, age and duration of residence.

In the sex groups, gingival pigmentation in both male and female group was mostly mild. In the male group, most of the subjects had mild pigmentation. Six out of 11 male subjects (54.5%) had mild maxillar pigmentation while 8 out of 11 (72.7%) had mild mandibular pigmentation. In the female group, most of the subjects also had mild pigmentation. There were 82 out of 89 female subjects (92.1%) had mild maxillar pigmentation and 84 out of 89 (94.4%) had mild mandibular pigmentation.

In the age groups, gingival pigmentation assessed in both maxilla and mandible was mostly mild. In the 12-16 years old group, 2 out of 2 subjects (100%) had mild pigmentation on both of their maxilla and mandible. In the 17-25 years old group, 39 out of 43 subjects (90.7%) had mild pigmentation on their maxilla and 38 out of 43 subjects (88.4%) had mild pigmentation on their mandible. In the 26-35 years old group, 42 out of 49 subjects (85.7%) had mild pigmentation on their maxilla and 46 out of 49 subjects (88.4%) had mild pigmentation on their mandible. In the 36-45 years old group, 3 out of 4 subjects (75%) had mild pigmentation on their maxilla and 4 out of 4 subjects (100%) had mild pigmentation on their mandible. In the 46-55 years old group, there was only 1 patient and this subject had mild pigmentation on both the maxilla and mandible.

Table 1 Average of maxillar and mandibular gingival pigmentation expressed as DOPI value based on characterization such as sex, age and duration of residence

| Characteristics | n (%) | Gingival Pigmentation (DOPI value) | |
|-----------------------|-----------|------------------------------------|-----------|
| | | Maxilla | Mandible |
| | | Mean±SD | Mean±SD |
| Sex | | | |
| Male | 11 (11.0) | 0.56±0.51 | 0.33±0.31 |
| Female | 89 (89.0) | 0.38±0.28 | 0.32±0.23 |
| Age group | | | |
| 12-16 years old | 2 (2.0) | 0.30±0.06 | 0.36±0.07 |
| 17-25 years old | 43 (43.0) | 0.37±0.31 | 0.30±0.27 |
| 26-35 years old | 49 (49.0) | 0.41±0.33 | 0.33±0.23 |
| 36-45 years old | 4 (4.0) | 0.52±0.35 | 0.38±0.27 |
| 46-55 years old | 1 (1.0) | 0.91± - | 0.66± - |
| > 65 years old | 1 (1.0) | 0.41± - | 0.41± - |
| Duration of residence | | | |
| ≥ 10 years | 72 (72.0) | 0.44±0.32 | 0.36±0.24 |
| < 10 years | 28 (28.0) | 0.29±0.29 | 0.22±0.32 |

Table 2 Average of maxillar and mandibular gingival pigmentation expressed as DOPI value based on characterization such as sex, age and duration of residence

| Characteristics | Gingival Pigmentation (DOPI value) | | | | | | | |
|-----------------------|------------------------------------|---------------|-------------------|-----------------|---------------|---------------|-------------------|-----------------|
| | Maxillar | | | | Mandibular | | | |
| | None n (%) | Mild n (%) | Moderate n (%) | Severe n (%) | None n (%) | Mild n (%) | Moderate n (%) | Severe n (%) |
| Sex | | | | | | | | |
| Male | 2 (18.2) | 6 (54.5) | 3 (27.3) | 0 (0.0) | 3 (27.3) | 8 (72.7) | 0 (0.0) | 0 (0.0) |
| Female | 2 (2.2) | 82 (92.1) | 6 (5.6) | 0 (0.0) | 3 (3.4) | 84 (94.4) | 2 (2.2) | 0 (0.0) |
| Age | | | | | | | | |
| 12-16 y.o | 0 (0.0) | 2 (100.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 2 (100.0) | 0 (0.0) | 0 (0.0) |
| 17-25 y.o | 1 (2.3) | 39 (90.7) | 3 (7.0) | 0 (0.0) | 3 (7.0) | 38 (88.4) | 2 (4.7) | 0 (0.0) |
| 26-35 y.o | 3 (6.1) | 42 (85.7) | 4 (8.2) | 0 (0.0) | 3 (6.1) | 6 (93.9) | 0 (0.0) | 0 (0.0) |
| 36-45 y.o | 0 (0.0) | 3 (75.0) | 1 (25.0) | 0 (0.0) | 0 (0.0) | 4 (100.0) | 0 (0.0) | 0 (0.0) |
| 46-55 y.o | 0 (0.0) | 1 (100.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | 0 (0.0) | 0 (0.0) |
| > 65 y.o | 0 (0.0) | 1 (100.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | 0 (0.0) | 0 (0.0) |
| Duration of residence | | | | | | | | |
| ≥10 years | 0 (0.0) | 65 (90.3) | 7 (9.7) | 0 (0.0) | 0 (0.0) | 70 (97.2) | 2 (2.8) | 0 (0.0) |
| <10 years | 4 (14.3) | 23 (82.1) | 1 (3.6) | 0 (0.0) | 6 (21.4) | 22 (78.6) | 0 (0.0) | 0 (0.0) |

Table 3 Association between duration of residence and severity of maxillar and mandibular gingival pigmentation among Nuha residents

| Duration of Residence | Gingival Pigmentation (DOPI value) | | | | | | | |
|-----------------------|------------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | Maxillar | | | | Mandibular | | | |
| | None n (%) | Mild n (%) | None n (%) | Mild n (%) | None n (%) | Mild n (%) | None n (%) | Mild n (%) |
| ≥10 years | 0 (0.0) | 65 (90.3) | 7 (9.7) | 0 (0.0) | 0 (0.0) | 70 (97.2) | 2 (2.8) | 0 (0.0) |
| <10 years | 4 (14.3) | 23 (82.1) | 1 (3.6) | 0 (0.0) | 6 (21.4) | 22 (78.6) | 0 (0.0) | 0 (0.0) |
| <i>p</i> value | | | 0.003* | | | | 0.000* | |

*Chi-square test, $p < 0.05$ significance

In the 65 years and older group, there was only 1 patient and this subject had mild pigmentation on both the maxilla and mandible.

In the duration of residence groups, subjects that had been living in Nuha District for at least 10 years, all (72 subjects) had gingival pigmentation and it was mostly mild: 65 (90.3%) had mild maxillar pigmentation and 70 (97.2%) had mild mandibular pigmentation.

Meanwhile, among subjects that had been living in Nuha District for less than 10 years, 4 out of 28 subjects (14.3%) had normal gingival color in their maxilla and 6 out of 28 subjects (21.4%) had normal gingival color in their mandible. Of subjects that had been living in Nuha District for less than 10 years and had gingival pigmentation, mostly were of mild severity, with 23 (82.1%) on the maxilla and 22 (78.6%) on the mandible.

Table 3 shows the significant association of duration of residence and severity of maxillar and

mandibular gingival pigmentation among Nuha residents.

Discussion

The present study was conducted to determine the association between duration of residence and severity of gingival pigmentation. This association can be translated as duration of exposure among Nuha District residents and may show accumulative effect of the exposure over the time.

Based on the results, there was significant association between duration of residence and severity of gingival pigmentation among Nuha District residents. The average DOPI value for people that has been living at least 10 years in the area was significantly higher than of those living for less than 10 years.

The concentration of heavy metal in the meat from animals raised in this district depends on

source of their food and their level of heavy metal exposure. In that study, the concentration of heavy metal in the meat was not above safety limit but other factors such as amount and frequency of feeding needs to be taken into account because of the accumulation effect.⁶ In another study by Oktaria et al.¹² duration of occupation as traffic police officers did have significant effect on the severity of heavy metalexposure as they found that gingival lead line was significantly more severe among police officers that had been on traffic duty for longer time.¹² These studies corroborates with our result that accumulative effect may present significantly in heavy metalexposure from the water, air and/or land.

In our study, we analyzed the severity of gingival pigmentation among several age groups. Although it has been studied that gingival pigmentation may becomes more apparent as a person becomes older,¹³ our study did not show the similar result. This difference can be explained as in this study, older age does not necessarily mean longer duration of residence in Nuha District since people might have been migrating in and out of the area prior to the study.

Conclusion

Duration of residence in a Nuha District, Luwu Timur Regency, South Sulawesi shows significant association with severity of gingival pigmentation among the residents. Such duration that represents the duration of exposure and accumulated amount of exposure. Further studies, e.g. blood level examination and biochemical tests are required to deepen our understanding on the dynamic interaction among the health of people and their environment especially in previously mined lands such as the Nuha District of Luwu Timur Regency, South Sulawesi.

Conflict of Interest

The authors report no conflict of interest.

References

1. Peeran SW, Ramalingam K, Peeran SY, et al. Gingival pigmentation index proposal of a new index with a brief review of current indices. *Eur J Dent* 2014;8: 287-290.
2. Dummett CO, Gupta OMP. Estimating the epidemiology of oral pigmentation. *J Natl Med Assoc* 1964;56: 419-420
3. Hasan S, Khan NI, Sherwani OAK, et al. Drugs causing orofacial pigmentation: an overview of literature. *Int Res J Pharm* 2013;4: 40-43.
4. Kauzman A, Pavone M, Blanas N, Bradley G. Pigmented lesions of the oral cavity: review, differential diagnosis, and case presentations. *J Can Dent Assoc* 2004;70: 682-683.
5. Dilea M, Prelipcean DD, Ioni D. About oral health of romanian children from various polluted area due to heavy metals. *UPB Sci Bull* 2012;74: 171-182.
6. El-Said KE, El-Ghamry AM, Mahdy NH, El-Bestawy NA. Chronic occupational exposure to lead and its impact on oral health. *J Egypt Public Health Assoc* 2008;83: 451-466.
7. Profil kecamatan Nuha. 2012 [Cited: 2014 November 30]; Available from : http://www.luwutimurkab.go.id/lutum/index.php?option=com_content&view=article&id=428&Itemid=302
8. Purnama A, Zakaria F, Kusumaningrum HD, Hasan S. Selected minerals in meat of cattle grazing in mine revegetation areas and safe consumption for human. *Food science and quality management* 2014; 30: 18-25
9. Setiadhi R, Soewondo W. Hubungan antara pigmentasi melanin pada Gingiva anak-anak dengan riwayat orang tua perokok di Rumah Sakit Gigi dan Mulut Fakultas Kedokteran Gigi Universitas Padjadjaran. *New Bionatura* 2011;13: 31-39.
10. Penyakit gingiva. Universitas Gadjah Mada. [cited: 2014 November 30]; Available from: <http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=0CEEQFjAE&url=http%3A%2F%2Ffelisa.ugm.ac.id%2Fuser%2Farchive%2Fdownload%2F51185%2F63ad3661c2d816bb3861f74ea1772816&ei=gcRVVK-aXIszguQTFkYKAag&usq=AFQjCNFP3pY3h2fpx-7pB0V8KgjEqvjRYQ&bvm=bv.78677474,d.c2E>
11. Petersen PE, Gormen C. Oral conditions among German battery factory workers. *Community Dent Oral Epidemiol* 1991;19: 104-106.
12. Oktaria C, Munandar S. Pengaruh masa kerja terhadap kejadian Gingival lead line pada polisi lalu lintas di kota Semarang. *Dental Health Department Medical Faculty Diponegoro University* 2009. p. 1-35.
13. Ghapanchi J, Darvishi M, Derafshi R, et al. Prevalence of Oral pigmented lesions: a prospective study. *Aust J Basic & Appl Sci* 2012;6: 417-420.



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The effectiveness of betel leaf (*piper betle* Linn) extract gel and cocoa bean (*theobroma cacao* L) extract gel application against the hardness of enamel surface *in vitro*.



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Abstract

Objective: Nowadays several ways have been evolved to increase the hardness of the enamel surface as an effort to prevent caries. One of the alternatives that can be used is application of gel with herbal basic material.

Material and Methods: Use of herbal basic material is preferred by people because the side effects are relatively small compared to synthetic drugs. Piper betle and cocoa beans are medicinal plants that is often used by people to inhibit caries. This is because piper betle and cocoa beans contain hardness that may influence the enamel surface. Maxillary first premolar teeth, which has been extracted and does not have caries, were divided into 3 treatment groups: piper betle extract gel, cocoa bean extract gel and distilled water as a negative control.

Each treatment group consisted of 8 samples. Samples before and after the application in each treatment group were measured using Universal Hardness Tester.

Results: Data were collected and analyzed using ANNOVA Repeated test. Showed there were significant differences ($p < 0.05$) of enamel surface hardness before and after the application of cocoa bean extract gel. There were no significant differences ($p > 0.05$) of enamel surface hardness before and after the application of piper betle extract gel and distilled water.

Conclusion: That cocoa bean extract gel is more effective to increase the hardness of email surface.

Keywords: Cocoa bean, Hardness of email surface, Piper betle linn

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Introduction

Teeth are a chewing tool in the digestive system of the human body. Dental disease that is often suffered by almost all of Indonesian people is caries. Basic Health Research or Riset Kesehatan Dasar 2007 showed that the prevalence of active caries in Indonesia is 46,5%.¹⁻⁴

Caries is an inflectional disease caused by email and dentin demineralization which is closely linked with the consumption of foods that are cariogenic. There are several ways to prevent caries, started from brushing teeth regularly, mouthwash and fluoride application to the use of toothpaste made from herbs, such as betel leaf.^{1,5,6}

Betel leaf contains many organic compounds which are essential oil, alkaloid, flavonoid, tannin and polyphenol. Polyphenols in betel leaf act as an antiseptic agent and can inhibit biological activity of *S. mutans*, bacteria that causes tooth caries.⁷ The increase in the hardness of email surface after the application of betel leaf extract gel. This is due to the binding reaction between calcium hydroxyapatite and tannin in betel leaf.⁵

Theobromine is an alcaloid compound from metilxantina group contained in cocoa bean or

chocolate (*teobroma cacao*). The last few years, theobromine has been researched for its use in the dental health field, as it has anti-cariogenic effect which is higher than fluoride in reducing email solubility after phosphoric acid exposure. The effect of distilled water mixed with theobromine powder were effective to increase the hardness of email surface.^{8,9}

Email as the outermost and hardest layer in the teeth consists mostly of hydroxyapatite crystals. This crystal is permeable to ions and molecules in direct contact to the surface. When email come into contact with acid, the calcium ion will dissolve and cause a decrease in the hardness of dental surface so that this become early caries.¹⁰⁻¹²

Hardness is defined as object's endurance against penetration. Email hardness is one of the email physical characteristic which is affected by the number of inorganic materials such as calcium. The dilution of calcium and hydroxyapatite crystals can decrease email hardness making it susceptible to caries. The hardness of email surface is one of the important factors in the physical characteristic of teeth.^{12,13}

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Several studies have shown that betel leaf and cocoa bean have an influence on the increase in the hardness of email surface. But there has been no research that suggests comparison on the effectiveness of betel leaf extract and cocoa bean extract in the form of gel on the hardness of email surface.

Based on the description above, the authors wanted to do a research about the effectiveness of using betel leaf (*piper betle linn*) extract gel and cocoa bean (*teobroma cacao L*) extract gel against the hardness of enamel surface *in vitro*.

Material and Methods

Study type which was applied was experimental laboratories. The research was conducted at Conservation Laboratory in Faculty of Dentistry Hasanuddin University, Biology Laboratory UNM and Mechanic Laboratory Politeknik Negeri Ujung Pandang from September to October 2016. Studied samples were maxillary first premolar teeth. Criteria of the samples was maxillary first premolar teeth which was extracted with orthodontic reason, rooted in two and the apex tip has closed perfectly.

Tools and materials used in this study: Handpiece high speed (Pana-Air® Japan), carborundum disk drill (Edenta®, Swiss), individual plastic containers, tweezer, blender, funnel and filter paper, evaporation machine (Hanshin®, Japan), Vickers Hardness Tester, analytical balance, mortar and pestle, disposable 1 cc, glass tools, betel leaf extract gel 15%, distilled water (Aqua®, Indonesia), cocoa bean extract gel 15% and gel making materials (carbomer 2%, TEA 2%, calcium carbonate 20%, sodium lauryl sulfate 1%, AgNO₃ solution 70%, sodium saccharine 0.1%, menthol 0.4%, sodium benzoate 0.1%, distilled water).

Sample preparation

The entire sample of 24 teeth soaked in saline. Teeth were then separated from root and crown at 2 mm below the CEJ using carborundum disc. Teeth were cleaned by using a brush and pumis, then dried with an air blow. Each sample was divided into three treatment groups and each was given a serial number. Group 1: betel leaf extract gel, Group 2: cocoa beans extract gel, Group 3: distilled water. After that the orthoplast beams was made with 1 cm high then the samples were planted on orthoplast mold with labial surface of teeth facing upward.

Preparation of betel leaf extract and cocoa bean extract

Betel leaf that has been cleaned then weighed 100 grams each for the manufacture of dry powder. It dried for 24 hours then weighed to determine the weight of powdered betel leaf that has been dried.

Dried leaf then blended for 3 minutes and placed into erlenmeyer flask before added ethanol 70%. Filtration was performed using fine filter paper. The solvent evaporation was conducted by using evaporation machine for 45 minutes. Betel leaf crude extract was then stored in glass bottle.

Cocoa bean was dried with aerated for approximately 24 hours. Cocoa bean then coarsely ground and aerated again until dried for approximately 48 hours and then pulverized to a powder in a blender. Powdered cocoa beans were weighed using an analytical balance as much as 200 grams. Cocoa powder then soaked with 80% ethanol of 300 ml for 24 hours and then macerated with constant stirring and then filtered using a filter paper. The filtrate then concentrated by rotary evaporation machine for 2 hours to separate the solvent from cocoa beans extract, and then the filtrate was transferred to a water bath for 4×24 hours to evaporate residual ethanol in the extract to obtain crude and viscous extract. After that the extract was diluted by series dilution using sterile aqua bidestilata solvent to obtain a concentration of 15%.

Preparations of betel leaf extract gel and cocoa bean extract gel

The preparation of this teeth gel cleansing was done by adding carbomer 940 and hot water into a mortar and then stirred it. Added TEA, homogenously stirred until the gel swelled, kept it for 24 hours (M-1). After that, put in AgNO₃ solution little by little while stirred. Added calcium carbonate and stirred. Then added menthol which has been diluted in ethanol into the mortar contained gel base and homogenized it. After that, put in sodium benzoate, sodium lauryl sulfate and sodium saccharine that have been diluted before by using hot water then homogenized it (M-2). Combined M-1 and M-2, homogenously stirred and added betel leaf extract and cocoa bean with concentration of 15%, homogenized it.

Hardness test of email surface.

Hardness test was conducted on every sample by using Vickers Hardness Tester and then recorded. First measurement was conducted without treatment on 24 samples (pre-test). Score obtained an initial hardness score before being treated. The next hardness test performed as follows: sample placed on universal hardness tester table, then performed indentation on the enamel surface using steel balls corresponding emphasis brinell method. First, performed the installation of the penetrator, which is a steel ball with a diameter of 2.5 mm and a ring nut on the tool. Then, handwheel contained in the tool was rotated slowly until the labial surfaces of

the teeth in contact with penetrator. The measurement results can be viewed on the monitor screen after 10 seconds.

Having obtained the initial hardness score, the next stage was testing stage of the sample in the test material. Each sample of 8 samples in group 1 was polished with betel leaf extract gel until the entire labial surface was covered and leaved it for 5 minutes. After 15 minutes the sample was measured twice to get the average value of hardness of each sample. Samples then irrigated by using saline to clean the gel has been applied before. Then applied the polishing betel leaf extract gel and leaved it for 15 minutes then gave the same treatment with intervention time for 35 minutes. Group II with cocoa beans extract gel was given the same treatment in group I. Group III soaked in a container containing distilled water until the entire surface of the tooth labial submerged and left it for 5 minutes, 15 minutes and 35 minutes.

Results

Table 1 showed the means of enamel hardness surface used betel leaf extract gel. Table above can be seen that enamel hardness increased in interval time 5 minutes. While enamel hardness decreased in interval time 15 minutes and 35 minutes. Enamel hardness surface in pre is 117.713, in post 1 is 120.673, in post 2 is 108.625 and in post 3 is 101.438. Based on result of repeated ANNOVA test, obtained p -value = 0.185 ($p < 0.05$ significant).

It means that betel leaf extract gel has no significant effect of enamel hardness surface.

Table 2 showed the means of enamel hardness surface used cocoa seed extract gel. The table above shows that enamel hardness surface increased significantly in time interval pre through post 1, nevertheless it decreased in time interval on post 2 and post 3. Enamel hardness surface in pre time is 116.025, in post 1 is 132.800, in post 2 is 122.600 and post 3 is 117.063. Based on the result of repeated ANNOVA test, obtained p -value = 0.031 ($p < 0.05$; significant). It means that cocoa seed extract gel has significant effect in the enamel hardness surface.

Table 3 shows the means of enamel hardness surface uses aquades. It can be seen that enamel hardness decreased on time interval pre, post 1 and post 2 and increased in post 3, however no surpass level of before experiment hardness. Enamel hardness surface in pre time is 148.288, post 1 is 137.550, post 2 is 135.575 and post 3 is 140.925. Based on the result of repeated ANNOVA test, obtained p -value = 0.321 ($p < 0.05$; significant). It means that aquades has no significant effect to enamel hardness surface.

Discussion

Enamel is a tissue which undergo high mineralization and susceptible acid. Enamel contains, based on its weight, 95-98% anorganic, 1-2% organic and 4% water. High mineral provides hardness and solidity, yet brittleness. Mineral on human tooth, which provides it, is calcium hydroxyapatite

Table 1 The differences from enamel hardness between time intervention and betel leaf extract gel

| Material | Pre (0 minute) | Post 1 (5 minute) | Post 2 (15 minute) | Post 3 (35 minute) | P-value |
|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------|
| | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | |
| Betel leaf extract gel | 117.713 \pm 28.4744 | 120.637 \pm 23.6197 | 108.625 \pm 19.6479 | 101.438 \pm 26.7899 | 0.185* |

*Repeated ANNOVA Test: $p > 0.05$: not significant

Table 2 The differences from enamel hardness surface between time intervention and cocoa seed extract gel

| Material | Pre (0 minute) | Post 1 (5 minute) | Post 2 (15 minute) | Post 3 (35 minute) | P-value |
|------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------|
| | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | |
| cocoa seed extract gel | 116.025 \pm 17.9194 | 132.800 \pm 28.4177 | 122.600 \pm 28.1209 | 117.063 \pm 30.6776 | 0.031* |

*Repeated ANNOVA Test: $p < 0.05$: Significant

Table 3 The differences of enamel hardness surface between time intervention and aquades

| Material | Pre (0 minute) | Post 1 (5 minute) | Post 2 (15 minute) | Post 3 (35 minute) | P-value |
|----------|-----------------------|----------------------|-----------------------|-----------------------|---------|
| | Mean \pm SD | Mean \pm SD | Mean \pm SD | Mean \pm SD | |
| Aquades | 148.288 \pm 14.8307 | 137.550 \pm 8.7158 | 135.575 \pm 14.1243 | 140.925 \pm 17.1674 | 0.321* |

*Repeated ANNOVA Test: $p > 0.05$: not significant

(Ca₁₀(PO₄)₆(OH)₂). Enamel can solve when contacts with acid, which produce half or all mineral of enamel dissolve and decrease enamel hardness.

Electing time for gel application in 5, 15 and 35 minutes for 5 minutes are time estimation used for applies gel per day. So that the total time estimation needed for applying gel in 3 days are 15 minutes while apply gel for 7 days need 35 minutes.

This study is using Universal Hardness Tester tools for hardness test by performing indention on enamel surface using steel ball pressure according to brinell method. Vickers Hardness Number (VHN) determined by standard table referention which is defined by convert result value of brinell method analysis.

Table 1 showed no significant effect of increased enamel hardness surface after application of betel leaf extract gel. Decrease of enamel hardness surface related to 0.1-1.3% tannin acid on betel leaf extract.¹⁷ According to a study by Hagerman¹⁸ tannin acid can easily bonded with protein that produce protein complex. There are some proteins, called amelogenin, on enamel mineralization. Protein establish approximately 58% organic on enamel. It is indicate that tannin and protein bond on enamel and affect enamel hardness surface. There is chemical bonded between tannin acid and protein on enamel when measuring enamel hardness surface. The bond covered enamel surface and caused enamel hardness decrease.

Decrease of enamel hardness surface consort that betel leaf extract contains tannin acid, lead to increase of demineralization on enamel surface. Solubility of enamel surface, caused by acid is reaction between hydrogen ion and anorganic material of enamel forms. The increase of phosphat ion and H⁺ ion caused pH of hydroxiapatite crystal decrease up to 4.5 which indicates porosity form on enamel. The decrease of enamel hardness surface is affected tannin acid and gel bond as well. If tannin acid is blended with gelatin, it would be a sedimentation. This sedimentation covers enamel surface and causes enamel hardness surface decrease. Application of betel leaf extract gel approximately 5 minutes, leads to increase of enamel hardness surface. It is caused by reaction between tannin acid and calcium hydroxiapatite. Bond between tannin acid and calcium hydroxiapatite form new layer leads to enamel hardness surface increase, yet the increase is not significant.⁵

Table 2 showed the increase of enamel hardness surface significantly after used cocoa extract gel. This ensued because the contents of teobromin. Theobromin is a chemical substances from alcaloid. This study used silver nitrate solvent (AgNO₃). Theobromin and silver nitrate can establish sediment in alkaline environment by releasing H ion.

This sedimentation established new layer on enamel surface. Although teobromin is a weak acid, pH 8.6 and 9.9 pKa, when it bonds with silver nitrate, they will release H ion which causes remineralization increase thus presence calcium hydroxiapatite and leads to the increase of enamel hardness surface.¹⁹

Enamel hardness surface decreased in minutes 15th and 35th of application, which was caused by unfermented cocoa. It consort with study by Widayat²⁰ reported that unfermented cocoa seed contains 9.1-9.6% sugar. The more the cocoa fermented, the more the sugar decreased. It was occurred because sugar level in cocoa seed, used by khamir, establish alcohol, that caused sugar level high and split alcohol became lactac acid and acetic acid.²⁰ That alcohol drinks is able to decrease enamel hardness surface because it contains acid, lactac acid and acetic acid are chelating agents, which bond calcium into saliva and decrease remineralization on enamel surface.¹¹

Table 3 showed no significant increase differences on enamel hardness surface sample after soaked into aquades, although it increased on 35th minutes soaked. Aquades has ability to dissolves enamel calcium and decrease enamel solubility based on applying time. It is based on pH alkaline of aquades.

Conclusion

Application of 15% cocoa seed extract gel effective to increase enamel hardness surface compared to 15% betel leaf extract gel and aquades. The more 15% betel leaf extract gel and 15% cocoa seed extract gel apply, the more enamel hardness surface decrease. The more it soaked into aquades, the more enamel hardness surface increase.

Conflict of Interest

The authors report no conflict of interest.

References

1. Worotitjan I, Mintjelungan CN, Gunawan P. Pengalaman karies gigi serta pola makan dan minum pada anak sekolah dasar di desa Kiawa kecamatan Kawangkoan Utara. *Jurnal e-Gigi* 2013;1: 59-68.
2. Theo M, Abidjulu M, Wicaksono DA. Gambaran kebororan tepi tumpatan pasca restorasi resin komposit pada mahasiswa program studi kedokteran gigi angkatan 2005-2007. *Jurnal e-Gigi* 2013;1: 115-120.
3. Hidayati NA, Kaidah S, Sukmana BI. Efek pengunyahan permen karet yang mengandung xylitol terhadap peningkatan pH Saliva Dentino *Jur Ked Gigi* 2014;1: 52.
4. Soesilo D, Santoso RE, Diyatri I. Peranan sorbitol dalam mempertahankan kestabilan pH Saliva pada proses pencegahan karies. *Maj Ked Gigi* 2005;38: 25-28.
5. Wiselyana IT, Noerdin A, Soufyan A. Penggunaan aplikasi gel ekstrak daun sirih terhadap kekerasan email. *Fak Kedokteran Gigi Universitas Indonesia* 2013: 1-3.

6. Sumini, Amikasari B, Nurhayati D. Hubungan konsumsi makanan manis dengan kejadian karies gigi pada anak prasekolah di TK B RA Muslimat PSM Tegalrejo Desa Semen Kecamatan Nguntoronadi Kabupaten Magetan. *Jurnal Delima Harapan* 2014;3: 20-27.
7. Pratiwi R. Perbedaan daya hambat terhadap *Streptococcus Mutans* dari beberapa pasta gigi yang mengandung herbal. *Maj Ked Gigi* 2005;38: 64-67.
8. Syafira G, Permatasari R, Wardani N. Teobromine effects on enamel surface microhardness: in vitro. *J Dent Indonesia* 2012;19: 32-36.
9. Sena AR, Assis SA, Branco A. Analysis of teobromine and related compounds by reverse phase high-performance liquid chromatography with ultraviolet detection. *Food Technol Biotechnol* 2011;49: 413-423.
10. Habar EH. Pencegahan dekalsifikasi enamel setelah perawatan Ortodonti. *J Dentofasial* 2009;8: 1-5.
11. Magista M, Nuryanti A, Wahyudi IA. Pengaruh lama perendaman dan jenis minuman beralkohol bir dan tuak terhadap kekerasan email gigi manusia (in vitro). *Maj Ked Gigi* 2014;21: 48-53.
12. Riani MD, Oenzil F, Kasuma N. Pengaruh aplikasi bahan pemutih gigi Karbamid Peroksida 10% dan Hidrogen Peroksida 6% secara Home Bleaching terhadap kekerasan permukaan email gigi. *J Kes Andalas* 2015;4: 345-350.
13. Suprastiwi, Endang. Penggunaan karbamid peroksida sebagai bahan pemutih gigi. *J Dent Indonesia* 2005;12: 139-145.
14. Roberson TM, Heymann HO, Swift EJ, et al. *Sturdevant's art and Science of operative dentistry*. 4th ed. United States of America: Mosby; 2002. p. 16-31.
15. Adhani R, Widodo, Sukmana BI, et al. Effect pH on Demineralization dental erosion. *Int J Chem Eng Appl* 2015;6: 138-141.
16. Seow WK, Thong KM. Erosive effect common beverages on extracted premolar teeth. *Aust Dent J* 2005;50: 173-178.
17. Pradhan D, Suri KA, Biswasroy P. Golden heart of nature: piper betle linn. *J Pharmacogn Phytochem* 2013;1: 147-167.
18. Hagerman AE. *The handbook of tannin*. Elsevier; 2011. p. 315.
19. Pinila EM, Astibia AO, Franco R. The relevance of theobromine for the beneficial effects of cocoa consumption. *Front Pharmacol* 2015;6: 30.
20. Widayat HP. Karakteristik mutu biji kakao hasil fermentasi dengan berbagai cara dan interval waktu pengadukan. *JTIP Indonesia* 2015;7: 7-11.
21. Panigoro S, Pangemanan DHC, Juliatri. Kadar kalsium gigi yang terlarut pada perendaman minuman isotonik. *J e-Gigi* 2015;3: 359.
22. Chuenarrom C, Benjakul P, Daosdsai P. Effect of indentation load and time on knoop and vickers microhardness test for enamel and dentin. *Mat Res* 2009;12: 473.



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Effectiveness of siwak salvadora persica extract to aggregatibacter actinomycetemcomitans as one of pathogenic bacteria causing periodontal disease



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Abstract

Objective: Periodontal disease is one of oral and dental diseases which most commonly found in humans caused by several factors, one of them due to the accumulation of bacterial plaque. Aggregatibacter actinomycetemcomitans is a bacterial pathogen that frequently causes periodontal disease.

Material and Methods: Sample of *A. actinomycetemcomitans* colonies in MHA medium. Twenty four samples were divided into six treatment groups, they were 5 groups given the extract siwak with concentration of 3.125%, 6.25%, 12.5%, 25%, 50% and 1 group treated with control DMSO 5%. Inhibition zone

was measured after 48 hours incubation at 37°C and measured using caliper. To inhibit the growth of these bacteria can be done by using natural ingredients that contain anti-bacterial agent.

Results: Data analysis was performed using Kruskal Wallis test. The mean diameter of inhibition zone at concentrations of 3.125%, 6.25%, 12.5%, 25% and 50% were 6.4 mm, 7.0 mm, 7.2 mm, 7.9 mm and 8.6 mm.

Conclusion: Siwak extract can inhibit the growth of *A. actinomycetemcomitans* which is one of pathogenic bacteria causing periodontal disease.

Keywords: Siwak extract, Aggregatibacter actinomycetemcomitans, Periodontal disease

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Introduction

Periodonsium is tooth-supportive tissue which consist of gingiva, periodontal ligament, cementum and alveolar bone. It is divided into two parts i.e. gingiva that has main function in protecting the underlying tissue and connective part which consist of periodontal ligament, cementum and alveolar bone.¹ According to Basic National Health Survey in 2013, national prevalence of dental and oral problems was 25.6%. Sixteen provinces had dental and oral problems above the national value, they are Aceh 30.5%, DKI Jakarta 29.1%, Jawa Barat 28.0%, DI Yogyakarta 32.1%, Jawa Timur 28.6%, Nusa Tenggara Barat 26.9%, Nusa Tenggara Timur 27.2%, Kalimantan Selatan 36.1%, Sulawesi Utara 31.6%, Sulawesi Tengah 35.6%, Sulawesi Selatan 36.2%, Southeast Sulawesi 28.6%, Gorontalo 30.1%, West Sulawesi 32.2%, Maluku 27.2% and Maluku Utara 26.9%.²

Damage to the periodontal tissues is usually due to the accumulation of bacterial plaque on the tooth crown which then extends into the gingival sulcus and impair the adjacent gingiva.³ Most common bacteria which found in people suffering periodontal disease are porphyromonas gingivalis, treponema denticola, tannerella forsythia and *A. actinomycetemcomitans*.¹

A. actinomycetemcomitans is one of the bacteria found in periodontal disease, including a

group of gram-negative bacteria, facultative anaerobes, coccobacillus, non-motile, colorless and capnophilic.^{4,5} To inhibit the growth of these bacteria can be done in various ways, one of them is using natural ingredients from plants that contain antibacterial agents such as siwak.³

Siwak or *salvadora persica* is a medical plant whose roots have been widely used by many people in Africa, South America, Middle East and Asia. Siwak is a plant that is very popular in the Middle East. The World Health Organization (WHO) recommends and advocate siwak as an effective tool for oral hygiene, with softwood fiber mechanical action and its chemical therapeutic action.⁶ Siwak contains essential oils and a variety of other chemical compounds, i.e. Anorganic compound, such triethylamine, alkaloids, flavonoids, anthraquinone, tannins, saponins, sterols, vitamin C and inorganic compounds, such chloride, calcium, a large amount of fluoride, silica and sulfur, the chemical components of essential oils contained in miswak leaves such benzyl nitrile, eugenol, thymol, isothymol, eucalyptol, isoterpinolen and beta-caryophyllen.⁷

The research results of inhibition test of siwak on porphyromonas gingivalis showed that siwak wood have inhibitory activity against porphyromonas

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gingivalis. Therefore, the authors are interested in investigating the effectiveness of siwak against *A. actinomycetemcomitans* which is one of the pathogenic bacteria causing periodontal disease.

Material and Methods

This was laboratory experiments research conducted at the Phytochemistry Laboratory Faculty of Pharmacy, Hasanuddin University and Microbiology Laboratory Faculty of Medicine, Hasanuddin University. Siwak wood mashed then diluted with 96% ethanol for five days. Then filtered using filter paper and the filtrate was evaporated using a rotary evaporator in order to obtain a thick extract.

Siwak extract was made into five different concentration which were 3.125%, 6.25%, 12.5%, 25% and 50% with DMSO 5% as negative control.

Then, it was tested on *A. actinomycetemcomitans*, replication was performed four times according federer sample size formula. Incubation during 1x48 hour in temperature of 37°C. After that, measure the clear zone using caliper.

Results

It has been performed research about the effectiveness of siwak extracts against *A. actinomycetemcomitans*. This laboratory experiment was conducted at the phytochemistry Laboratory, Faculty of Pharmacy and Microbiology Laboratory, Faculty of Medicine, Hasanuddin University. This posttest was only with control group design conducted in November to December 2016. This research sample is *A. actinomycetemcomitans* preparations that had been cultured in the laboratory.

This study used five siwak extract concentration, the concentration of 3.125%, 6.25%, 12.5%, 25% and 50%, using 5% DMSO as a negative control. Based on the sample size formula Federer, the number of samples in each group concentration and control, respectively four samples for each group, so that the overall amount of the sample of 24 bacteria preparation. Inhibition was measured after treatment given [figure 1](#). The size of the clear zone that occurred was a measure of inhibition power of treatment and measured using a caliper and expressed in millimeters (mm). After that, data was collected, processed and analyzed using SPSS version 22.0. Results of the study appear in the table of distribution as follows:

[Table 1](#) shows that the differences in vast of inhibition zone in each treatment and control groups, where there are four samples of bacterial preparations for each group. Based on these data, the lowest mean of board inhibition zones was at 3.125% concentrations and the highest mean of inhibition zone was at 50% concentration. In this study, using Kruskal Wallis test it showed that p-value: 0.005 ($p < 0.05$), this means that there were significant differences in vast of inhibition zones between siwak with 3.124%, 6:25%, 12.5%, 25%, 50% concentration and control DMSO 5% in inhibiting the growth of bacteria *A. actinomycetemcomitans*. Due to the results obtained meaning-ful, then the test continues to see the differences of the various concentrations.

In [table 2](#) comparison of two groups of concentration that has p-value < 0.05 means that there were significant differences between the two groups of those concentrations, whereas the comparison of DMSO 5% with concentration of 3.125% ($p: 0.508$), DMSO 5% with 6.25% ($p: 0.219$), the concentration of 3.125% with 6.25% ($p: 0.386$), the concentration of 3.125%

Table 1 Differences of wide of inhibition zone (mm) using siwak extract with 3.125%, 6.25%, 12.5%, 25%, 50% concentration and DMSO 5% as control

| Intervention | n | Wide of inhibition zone | |
|--------------|----|-------------------------|---------|
| | | Mean \pm SD | p-value |
| DMSO 5% | 4 | 6.2 \pm 0.000 | 0.005 |
| 3.125% | 4 | 6.4 \pm 0.440 | |
| 6.25% | 4 | 7.0 \pm 0.910 | |
| 12.5% | 4 | 7.2 \pm 0.590 | |
| 25% | 4 | 7.9 \pm 0.518 | |
| 50% | 4 | 8.6 \pm 0.434 | |
| Total | 24 | 7.2 \pm 0.990 | |

*Kruskal Wallis Test: $p < 0.05$; significant

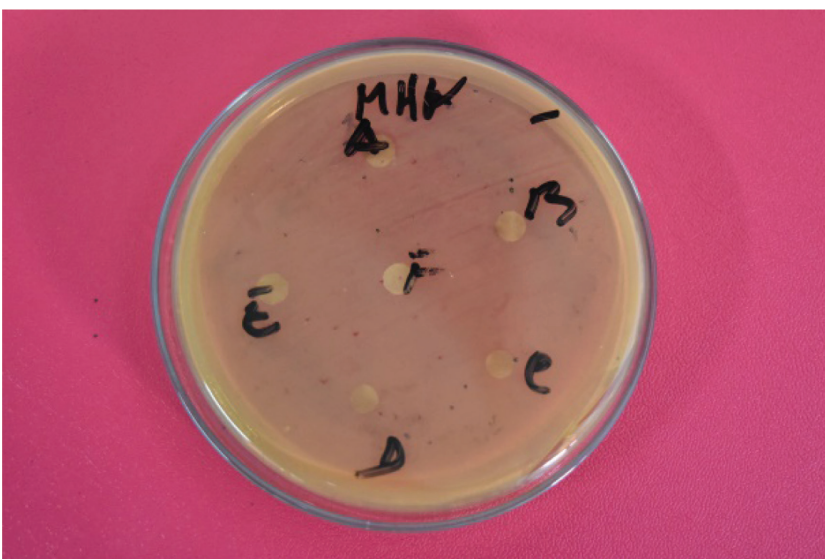


Figure 1 Inhibition zone of siwak extract on *A. actinomycetemcomitans*

Table 2 Differences between intervention groups

| Groups | | Mean ± SD | p – value |
|---------|--------|-------------|-----------|
| DMSO 5% | 3.125% | 6.4 ± 0.440 | 0.508 |
| | 6.25% | 7.0 ± 0.910 | 0.219 |
| | 12.5% | 7.2 ± 0.590 | 0.013 |
| | 25% | 7.9 ± 0.518 | 0.013 |
| | 50% | 8.6 ± 0.434 | 0.013 |
| 3.125% | 6.25% | 7.0 ± 0.910 | 0.386 |
| | 12.5% | 7.2 ± 0.590 | 0.081 |
| | 25% | 7.9 ± 0.518 | 0.020 |
| | 50% | 8.6 ± 0.434 | 0.020 |
| 6.25% | 12.5% | 7.2 ± 0.590 | 0.772 |
| | 25% | 7.9 ± 0.518 | 0.245 |
| | 50% | 8.6 ± 0.434 | 0.020 |
| 12.5% | 25% | 7.9 ± 0.518 | 0.080 |
| | 50% | 8.6 ± 0.434 | 0.019 |
| 25% | 50% | 8.6 ± 0.434 | 0.080 |

*Mann Whitney test: p<0.05; significant

with 12.5% (p:0.081), the concentration of 6.25% with 12.5% (p:0.772), the concentration of 6.25% with 25% (p:0.245), the concentration of 12.5% with 25% (p:0.080), concentration of 25% with 50% (p:0.080) has a value of p>0.05 so there were no significant difference between the groups.

Discussion

Periodontal disease is a dental and oral diseases which most commonly found in humans, caused by several factors, one of them due to the accumulation of bacterial plaque. *A. actinomycetemcomitans* is pathogenic bacteria that frequently causes periodontal disease. To inhibit the growth of these bacteria can be done by using natural ingredients that contain anti-bacterial agent. One of the natural ingredients that contain antibacterial substances is siwak.

In the study conducted by Ashshobirin et al.³ showed that siwak wood extract can inhibit the growth of bacteria *porphyromonas gingivalis*, this is due to the chemical compounds contained in siwak wood containing antibacterial activity such as saponins, flavonoids, tannins, alkaloids and terpenoid.³

Research by Santoso⁸ that the effect of the siwak extract solution can inhibit the growth of *S. mutans* in vitro and in vivo.⁸ Al-Bayaty also expressed alcohol extract of siwak produce good and safe antibacterial activity Besides of antibacterial, Kumar et al.⁹ stated that siwak also contains antiulcer, antifungal, antiparasitic and antiviral.⁹

Based on the researches above, this study was conducted in order to investigate whether siwak extract can inhibit the growth of bacteria *A. actinomycetemcomitans*, which is one of the pathogenic bacteria causing periodontal diseases.

Siwak mashed and dried and then mixed with 96% ethanol and allowed to stand for five days. Then, the results of immersion filtered using filter paper and evaporated using rotary evaporator in order to obtain thick siwak extract. Siwak extract later made into five different concentration, i.e. 3.125%, 6.25%, 12.5%, 25% and 50% by using 5% DMSO as negative control, and then dropped into the paper disc and put it on preparation of *A. actinomycetemcomitans*. Then incubated for 48 hours and measuring inhibition zone using caliper. Large zone of inhibition continues to increase with increasing concentration of siwak extract. The highest inhibition zone presented in 50% concentrations and the lowest inhibition zone was at 3.125% concentration. The higher siwak extract concentration, the higher its antibacterial activity.

The data was tested using Kruskal Wallis to determine significance of inhibition zone on different concentration of siwak extract, test to determine the differences between the six treatment groups. The results obtained have significant difference at each concentration, except DMSO 5% with siwak extract at 3.125% concentration, DMSO 5% with siwak extract at 6.25% concentration, siwak extract at 3.125% concentration with 6.25%, siwak extract at 3.125% compared with 12.5%, concentration of 6.25% with 12.5%, siwak extract at 6.25% with 25%, siwak extract at 12.5% with 25%, siwak extract at 25% with 50%.

The results showed that the siwak extract can inhibit *A. actinomycetemcomitans*, with highest concentration of 50% and the lowest concentration of 3.125%. The antibacterial activity because siwak has compounds that can inhibit the growth of bacteria, such as tannins, saponins, flavonoids, alkaloids and terpenoids with a different mechanism. Tannins and flavonoids can interfere cell's permeability by wrinkled the cell walls. Disruption permeability, the cell cannot do its activities so that growth is impaired. Saponins have OH groups that destroy bacteria by destroying the cell wall and penetrate into the cell by dissolving the lipid layer. Alkaloids cause cell wall layers are not fully formed and cause cell death by disrupting components of the peptidoglycan in the bacteria cell.³

Conclusion

Siwak extract can inhibit the growth of *A. actinomycetemcomitans* which is one of

pathogenic bacteria causing periodontal disease. The higher concentration of siwak extract, the greater its inhibitory power. The highest concentration which can inhibit the growth of *A. actinomycetemcomitans* is 50% concentration and the lowest concentration is 3.125%.

Conflict of Interest

The authors report no conflict of interest.

References

1. Newman MG, Takei HH, Klokkevold PR, et al. Carranza's clinical Periodontology; 2012.
2. RI KK. Riset kesehatan dasar 2013.
3. Ashshobirin A, Dhartono AP, Ramadhany CA, et al. Efektifitas antibakteri ekstrak kayu siwak (*Salvadora Persica*) terhadap pertumbuhan bakteri *Porphyromonas Gingivalis* J BIMKGI 2014;2: 12-23.
4. Jain R, Mittal K, Kapoor S. Virulence factors of *A. Actinomycetemcomitans*. J Pharm Biomed Sci 2013;34: 1693-1698.
5. Bjurshammar N. On the red fluorescence emission of *Aggregatibacter Actinomycetemcomitans*. Open Journal of Stomatology 2012;2: 299-306.
6. Al-bayaty FH, Al-koubaisi AH, Ali NAW, et al. Effect of mouth wash extracted from *Salvadora Persica* miswak on dental plaque formation: A clinical trail. J Med Plant Res 2010;4: 1446-1454.
7. Marusin S, Chairul. Efek ekstrak air dan alkohol pada siwak (*Salvadora Persica* L.) terhadap peningkatan aktivitas dan kapasitas fagositosis sel Makrofag. Media Litbang Kesehatan 2012;22: 38-44.
8. Santoso O, Wardani AP, Kusumasari N. Pengaruh larutan ekstrak siwak (*Salvadora Persica*) terhadap *Streptococcus mutans*: studi in vitro dan in vivo. M Med Indones 2012;46: 163-167.
9. Kumar S, Rani C, Mangal M. A Critical review on *Salvadora Persica*: An important medicinal plant of arid zone. Int J phytomedicine 2012;4: 292-303.



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Angulation change of the third molar tooth in orthodontic treatment



CrossMark

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Abstract

Objective: Impaction of the third molar tooth mandibular is often found in patients with orthodontic treatment. In orthodontic treatment, extraction cases of impaction of the third molar tooth are usually performed but the patients often refuse this extraction. Extraction of premolar has a good effect on the third molar mandibular angulation during treatment.

Material and Methods: This study is a retrospective clinical study with descriptive analytic to find out the effect of the first mandibular premolar tooth extraction to angulation change of the third molar mandibular in orthodontic treatment with a standard edgewise method. Angulation change was performed by comparing the third molar mandibular angulation before and after orthodontic treatment with panoramic radiographs. Angulation of the third molar

tooth mandibular was calculated from the angle formed between the long axis of the tooth with the reference line infra-orbital.

Results: The sample was divided into three (3) groups of patients before treatment angulation of the third molar tooth mandibular under 30°, 30° to 60° and above 60°, then measured change of angulation and observed whether it increased, fixed or decreased. Results were analyzed by T- test and Wilcoxon test showed that there was a significant change in angulation of the third molar mandibular in orthodontic treatment with the first premolar tooth mandibular extraction.

Conclusion: The first premolar tooth mandibular extraction affects the angulation of the third molar tooth mandibular after orthodontic treatment.

Keywords: Angulation, Mandibular third molar, First premolar tooth extraction

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Introduction

Impaction tooth is tooth which fail to erupt completely at the right position. Impaction can happen because no space is available for tooth to grow in jaw and improper tooth angulation. Some cause factors are the bone is thick and compact, no space is available for tooth growth, next tooth obstructs tooth eruption, desidui tooth persistence and soft tissue cover chewy and rough tooth. Meanwhile, cause factors of the tooth itself are position and direction of tooth seed are abnormal, tooth eruption strength is less as well.^{1,2}

Generally, in plan of patient orthodontic treatment with impaction case of third molar tooth of mandibular is by repealing the tooth but sometimes patient refuses, and that condition can affect plan, result and stability of orthodontic treatment as well. One factor that influences stability of orthodontic treatment is alignment of tooth root, therefore in order to get stabile treatment result needed good tooth angulation so that it can distribute occlusal force proportionally in every tooth contact including the third molar tooth. Position and angulation of the third molar tooth of mandibular that are mesioangular impaction will cause

the tooth impulsion to anterior because of anterior component force that results to force distribution by stomatognathic system.²⁻⁴

In treatment of orthodontic with molar tooth impaction, there are three things that have to be considered whether it needs movement to the first molar tooth of distal or the second molar, or whether there is any space after extraction of other permanent teeth like premolar tooth when orthodontic treatment is performed.^{3,5}

It have found that there is angulation construction of the third molar mandibular in orthodontic patient with tooth extraction of premolar mandibular, because of the first molar tooth movement and the second molar tooth to mesial give more space in retro-molar so that it is possible to cause angulation change in the third molar tooth of mandibular. Yet in the third molar tooth of mandibular which isslant more than 40 degrees mesial toward occlusal plain in the end of treatment causes rising of impaction risk.^{2,6}

Angulation change of the third molar tooth of mandibular besides can be detected by clinical intra oral, teeth mold as well as radiographic, panoramic

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X-ray image is also a method that is often used to collect information about tooth position before and after orthodontic treatment.^{7,8} The aim of this research is to know the effect of the first premolar tooth extraction toward angulation change and direction of angulation change of the third molar tooth mandibular after orthodontic treatment by edgewise standard method.

Material and Methods

This research is a retrospective clinical research that is descriptive analytic to observe effect of the first premolar tooth extraction toward angulation change of the third molar tooth of mandibular in orthodontic treatment Edgewise standard fixed by using panoramic X-ray image before and after treatment. The research was performed in clinic of Orthodontic Specialist, Faculty of Dentistry, Padjadjaran University in the span April 2013 - December 2013.

Tooth angulation measurement was performed by look at the angle that is formed between long axis inclination line of the third molar tooth of mandibular and horizontal reference line. Horizontal reference line that is used is line that is withdrawn from left and right infra-orbital called infra-orbital line. Infra-orbital point is the most inferior point from orbital bone that can be observed by radiographic image from zygomatic bone lateral direction.⁸⁻¹⁰

Fixed orthodontic treatment patients who had been treated and avowed cure were recorded first, then 30 patients who fulfilled the criteria were taken as sample. Sample panoramic images before and after treatment were collected. After that the panoramic images were placed on tracing paper and continued with calculation of angulation change angle. The first calculation was measurement of angulation angle of the third molar tooth mandibular before treatment by withdrawing line from long axis of the third molar tooth mandibular of left and right toward infra-orbital line and was performed angle calculation of the third molar tooth mandibular left and right after treatment.

To avoid mistake because of human factor, calculation of this angulation angle was performed three times in the interval minimum 3 days. **Figure 1** angulation angle of the 60 third molar teeth mandibular before treatment was divided in three angulation angle range groups those were below 30°, 30° to 60° and above 60°.

Furthermore, **figure 2** angulation angle of the third molar mandibular was calculated after treatment and measured deviation of angulation change before and after orthodontic treatment. And then,

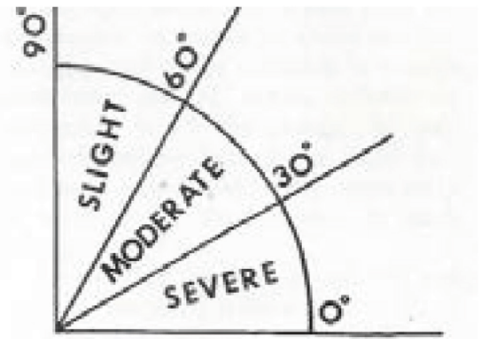


Figure 1 Classification of angulation of the third molar tooth mandibular group

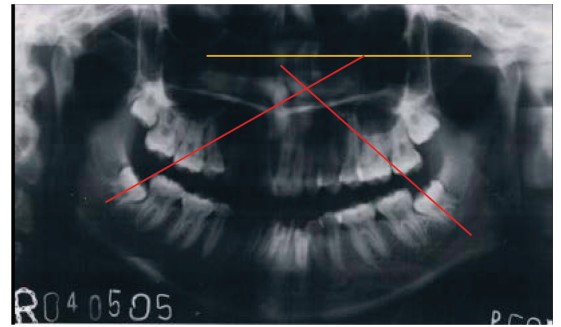


Figure 2 Angulation measurement of the third molar mandibular
Information: Infra-orbital line
The third molar tooth
Angulation

the calculation result was analyzed statistically to perceive ratio of the third molar angulation change in orthodontic treatment by extraction of the first premolar mandibular.

Results

Measurement of angulation angle change of the third molar tooth mandibular was performed for the third molar tooth mandibular of left and right, so that total of the third molar tooth mandibular which were observed was 60 teeth from 30 patients who had been treated orthodontic with extraction case of the first premolar tooth mandibular consisted of 9 men and 21 women from 16 to 25 years old.

Based on **table 1** and **2** above, angulation angle of the third molar tooth mandibular that experiences change consists of 36 teeth or 60% with smaller angulation angle and 24 teeth or 40% are bigger angulation angle after orthodontic treatment. By Wilcoxon test ratio angulation angle change bigger and smaller above, it is found that count value is $Z = -4.373$ with $p \text{ value} = 0.019$. This value is smaller than $p \text{ value} < 0.05$, so that the result is significant.

Based on **table 3** above from 24 of the third mandibular molar tooth which experience wider

Table 1 Angulation Change of The Third Molar Tooth Mandibular After Orthodontic Treatment

| | N | % | Cum. % |
|----|----|-------|--------|
| < | 36 | 60 | 60 |
| TB | 0 | 0 | 60 |
| > | 24 | 40 | 100 |
| N | 60 | 100.0 | |

Information: n = Total
 TB = Fixed
 > = Bigger
 N = Total
 < = Smaller
 Cum. % = Cumulative percentage

Table 2 Wilcoxon Test, Ratio of Angle Change wider and narrower

| | > - < |
|------------------------|--------|
| Z | -4.373 |
| Asymp. Sig. (2-tailed) | 0.019* |

Information: p-value 0.05.
 Z = Count value
 * = Significant

Table 3 Angulation Angle Change Frequency of The Third Molar Mandibular is wider After Orthodontic Treatment

| | Freq | % | Val % | Cum % |
|-------|------|-------|-------|-------|
| <30 | 9 | 37.5 | 37.5 | 37.5 |
| 30-60 | 12 | 50 | 50 | 87.5 |
| 60< | 3 | 12.5 | 12.5 | 100.0 |
| N | 24 | 100.0 | 100.0 | |

Information: < 30 = Angulation angle of the third molar tooth mandibular less than 30°
 30° to 60° = Angulation angle of the third molar tooth mandibular from 30° to 60°
 60 < = Angulation angle of the third molar tooth mandibular more than 60°
 N = Total sample

Table 4 Angulation angle change frequency of the third molar mandibular is narrower after orthodontic treatment

| | Freq | % | Val % | Cum % |
|-------|------|-------|-------|-------|
| <30 | 11 | 30.5 | 30.5 | 30.5 |
| 30-60 | 18 | 50 | 50 | 80.5 |
| 60< | 7 | 19.5 | 19.5 | 100.0 |
| N | 36 | 100.0 | 100.0 | |

Information: < 30 = Angulation angle of the third molar tooth mandibular less than 30°
 30° to 60° = Angulation angle of the third molar tooth mandibular from 30° to 60°
 60 < = Angulation angle of the third molar tooth mandibular more than 60°
 N = Total sample

changing angulation divided into based on the initial angle of the angulation of the third mandibular molar which produces as follows: angulation angle of the third mandibular molar tooth less than 30° as many as 9 teeth or 37.5%, angulated angle between 30° and 60° as many as 12 teeth or 50% and angulated angle more than 60 as many as 3 teeth or 12.5%.

Based on table 4 above of 36 the third mandibular molar which conduct smaller angulation angle changing divided into the initial angle of the

Table 5 Angulation angle change frequency of the third molar mandibular is greater after orthodontic treatment

| | Freq | < (%) | TB (%) | > (%) |
|-------|------|-----------|--------|-----------|
| <30 | 20 | 9 (45 %) | 0 | 11 (55 %) |
| 30-60 | 30 | 12 (40 %) | 0 | 18 (60 %) |
| 60< | 10 | 3 (30 %) | 0 | 7 (70 %) |

Information : < 30 = Angulation angle of the third molar tooth mandibular less than 30°
 30° to 60° = Angulation angle of the third molar tooth mandibular from 30° to 60°
 60 < = Angulation angle of the third molar tooth mandibular more than 60°
 Freq = frequency changing
 TB = no changing

Table 6 Angle changing comparatives of the third molar mandibular on left and right

| | n (%) ka | n (%) ki |
|----|-----------|-----------|
| < | 21 (70 %) | 15 (50 %) |
| TB | 0 (0 %) | 0 (0%) |
| > | 9 (30%) | 15 (50%) |
| N | 30 | 30 |

Information: < = Less than
 > = More than
 n = number
 TB = No changing
 N = Total

third mandibular molar which resulted as follows angulation angle of the third mandibular molar tooth less than 30° as many as 11 teeth or 30.5%, angulated angle between 30° and 60° as many as 18 teeth or 50% and angulated angle more than 60° as many as 7 teeth or 19.5%.

Based on table 5 above, it indicates that the angulation angle changing of the third molar before treatment which less than 30° of 20 teeth angulated angle changing become wider as many as 9 teeth of 45% and become narrower as many as 11 teeth or 55%. In the third molar between 30° and 60° of angulated angle as many as 30° teeth experience angulated changing as many as 12 teeth or 40% and more narrower as many as 18 or 60%. The third molar teeth with angulation angle is more than 60° as many as 10 teeth conduct a wider changing as many as 3 teeth or 30% and narrower as many as 7 teeth or 70%.

Based on the table 6 above, of 30 molar teeth experience angulation change become narrower as many as 15 teeth or 50% and become wider as many as 15 teeth or 50%, meanwhile 30 right region teeth, of which 21 teeth or 70% experience angulation change of the third mandibular molar teeth become narrower and 9 teeth or 30% experience angulation change of the third mandibular molar become wider.

Table 7 Mann-Whitney test on angular angle of the third molar mandibular teeth are wider and narrower on the left and right

| | Z | p-Value |
|---|-------|--------------------|
| > | -.209 | .861 ^{o)} |
| < | -.289 | .776 ^{o)} |

Information : P<0.05

°) : insignificant

<) : narrower

Z : counting number

>: wider

Table 7 mann-whitney statistical analysis above resulted in significant value which is wider is 861 and narrower is 776, the value above is more than $p>0.005$. It can be concluded that there is no significant differences angulation change of the third molar teeth on the left and right.

Discussion

Tarazona et al.⁴ in his study compared the influence of extraction and unextraction of the first premolar teeth in an orthodontic treatment to the angular changing of the third molar found that loss of the first premolar teeth provided a satisfied influence to the angular changing of the third mandibular molar teeth after treatment. found that by losing premolar teeth impacts posterior teeth movement to mesial direction thus provide a space in retro-molar and possibly result in angular changing of the third mandibular molar teeth 1.

Some study reported that there are significant angular changing of the third mandibular molar teeth into group of loss of the first premolar teeth compare to the group of unextracted of the first premolar teeth. Angular changing of the third mandibular molar teeth occur may be influenced by the available space in the retro-molar because of the movement to the mesial direction of the first molar teeth and the second molar teeth to fulfill available space because of the extraction.¹²

Wilcoxon test conducted to determine the angular changing differences of the third mandibular molar teeth between narrower and wider showing significant value of $P=0.0019$, p-value less than 0.05 table 2. The result describes that angular changing of the third mandibular molar teeth in an orthodontic treatment of Edgewise standard method with the extraction of the first premolar teeth significantly results to a narrower angular changing compare to wider angular changing.

The other research reported in his study that the premolar teeth extraction in orthodontic treatment results to the changing of the third molar teeth horizontally as well as vertically. In contrast with the other found that the first premolar teeth loss in the orthodontic treatment with the third mandibular molar teeth in angulation less than 40 tend to change its angulation become narrower and risk on the further impaction. Different from researcher who found that the extraction of the first premolar teeth result in the increasing of the third angular molar teeth degree to the occlusal plane and may reduce impactal risk.^{2,6,13}

Statistical test describes that the angular changing of the third mandibular molar teeth in left and right region have no significant difference. It found that premolar teeth extraction influences angular changing of the third mandibular molar teeth both unilateral and bilateral impaction and have found that angulation change value of the third mandibular molar teeth after orthodontic treatment is unpredictable.^{3,14}

Conclusion

Angular changing of the third mandibular molar teeth become narrower in all teeth angle of the third mandibular molar teeth which impacted in the orthodontic treatment edgewise standard with the first mandibular premolar teeth extraction. Furthermore, in case of the third mandibular molar teeth impaction with the first mandibular premolar teeth loss, orthodontist should consider to perform tooth extraction for the third molar tooth.

Conflict of Interest

The authors report no conflict of interest.

References

1. Saisel MY, Gokce DM, Iiken K, et al. The effects of first Premolar extraction on third Molar angulations. *Angle Orthod* 2005;75: 719-722.
2. Artun J, Thalib L, Little RM. Third Molar angulation during and after treatment of adolescent Orthodontic patients. *Eur J Orthod* 2005;27: 590-596.
3. Alkuwari HM, Talaket AA, Alsahli RM, et al. Influence of orthodontic treatment with first Premolar extraction on the angulation of the Mandibular third Molar. *Saudi Med J* 2013;34: 639-643.
4. Tarazona B, Vanessa P, Jose M, et al. Influence of first and second Premolar extraction or non-extraction treatments on Mandibular third Molar angulation and position. A comparative study. *Med Oral Patol Oral Cir Bucal* 2010;15: 760-766.
5. Capelli J. Mandibular growth and third Molar impaction in extraction cases. *Angle Orthod* 1991;61: 223-229.

6. Behbeni F, Artun J, Thalib L. Predicting of Mandibular third Molar impaction in adolescent Orthodontic patients. *Am J Orthod Dentofac Orthop* 2006;130: 47-55.
7. Ursi W, Almeida RR, Tavano O, et al. Assasement Of Mesiodistal axial inclination through panoramic radiography. *J Clin orthod* 1990;24: 166-173.
8. McKee IW, Williamson PC, Lam EW. The accuracy of 4 panoramic unit in the projection of Mesiodistal tooth angulation. *Am J Orthod Dentofac Orthop* 2002;121: 166-175.
9. Gohilot A, Pradhan T, Keluskar KM. Effect first Premolar extraction on maxillary and Mandibular third Molar angulation after Orthodontic therapy. *J Oral Biol Craniofac Res* 2012;2: 97-104.
10. McMinn R, Hutchings R, Logan BM. *Color atlas of head and neck anatomy*. 2nd ed. Barcelona: Mosby wolf; 1994. p. 10-16.
11. Dierkes DD. An investigation of the Mandibular third Molars in Orthodontic cases. *Angle Orthod* 1975;45: 207-212.
12. Ke HF, Wang CL, Liu L, et al. Effects of first Premolar extractions on third Molar angulations. *Shanghai Kou Qiang Yi Xue* 2006;24: 228-230.
13. Guo XH, Qian YF, Feng QP. Effects of different Premolar extraction on lower third Molar eruption. *Shanghai Kou Qiang Yi Xue* 2007;16: 370-373.
14. Risse G. The Angulation of Uppert 1st Permanent Molars, The Key to Functional Occlusin. *J Comp Dentof Orthod & Orthop* 2004;1: 20-32.



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Alveolar cleft closure with iliac bone graft: a case report



CrossMark

Tichvy Tammama,^{1*} Endang Syamsudin,¹ Fathurachman²

Abstract

Objective: The present article is to report a case of a patient with alveolar cleft that was treated with the application of iliac bone graft

Methods: A nine year-old girl with maxillary alveolar cleft had labioplasty and palatoplasty. The cleft was closed using iliac bone graft and the result was the canine erupts on the graft site get a better alveolar arch and no more oronasal fistule. Alveolar cleft can be treated by the use of iliac bone graft.

Results: Based on the clinical and radiographic development of the patient, the treatment for overall seemed success with the obtain of

maxillary arch continuity, provide bone that is available for permanent canine to erupt, optimal alar base reconstruction, the fistulae was eliminated, provide a better nasal alar cartilage support, get a stabil the maxillary segment for orthodontic treatment and obtain an ideal alveolar morphology.

Conclusion: The timing of alveolar bone grafting usually associated with the state of the developing of dentition. Post operative management is important to get a good result and to prevent any complications.

Keywords: Gnatoschizis, Alveolar cleft, Iliac graft, Gnatoplasty.

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Introduction

The alveolar cleft or gnatoschizis is a bony defect that exists in 75% patients with cleft lip and palate. Alveolar bone grafting is a surgical procedure that has been accepted with the purpose of obtaining maxillary arch continuity, to provide available bone for permanent canine to erupt, to maximize alar base reconstruction, to eliminate labial and palatal fistulae, to provide nasal alar cartilage support, to stabilize the maxillary segment after orthodontic treatment, to provide a solid maxillary structure before orthognatic surgery and to provide substructure for dental implant insertion or other prosthetic rehabilitation.^{1,2,7}

There are several controversies about the timing of the alveolar bone graft but it is most often related to the development of the permanent maxillary canine.¹ Most of the surgeon did the bone graft at eight to ten year-old, before the eruption of permanent maxillary canine which aims to obtain bony support for the canine to erupt and to support the lateral incisors. Some authors reported that approximately 60% of cleft patients may have malformation of the maxillary lateral incisor due to its position near the cleft site, so they suggested to close the alveolar cleft with graft earlier, at the age of 5-6 years in order to give any lateral incisor an opportunity to migrate into and erupt through the bone graft.^{2,3,5}

Some researchers suggested bone graft at an earlier age, between one and two years. However this is still controversial because it is not supported

by the data that prove the effectiveness on the resistance of the alveolar bone in adulthood or on maxillary growth.^{2,8,9}

The timing of alveolar cleft bone grafting has been divided into primary and secondary stages. Primary bone grafting performed after lip repair but before repairing the palate.¹⁰ Secondary grafting defined as early secondary stage done as the child reach 2-5 years old, early mixed dentition at 6-8 years old, late mixed dentition at 9-12 years old and it is called late secondary grafting if it is done when the age reaches 13.¹²

There are several sources of graft: autograft bone that is harvested from the same person, allograft bone that is harvested from another person and synthetic grafts that composed of calcium, silicon or aluminum. Bone grafts have two types: cancellous bone, that is commonly used for grafting nonunions or cavity defects because it is quickly remodeled and incorporated and cortical bone that is slower to turn over than cancellous bone which is used for structural defects.¹⁵

For autotransplantation of bone in cleft patients, several donor sites have been exploited: rib, tibia, skull, chin and iliac rest. All of these sources have been used successfully because they contain pure bone, cancellous and autogenous.^{3,10} However, the iliac crest is used to be the most suitable donor site, since it is easier to get an adequate amount of cancellous bone by percutaneous incision.^{2,3,10}

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Figure 1 Extraoral and intraoral image of the patient before surgery



Figure 2 Panoramic radiograph before bone grafting

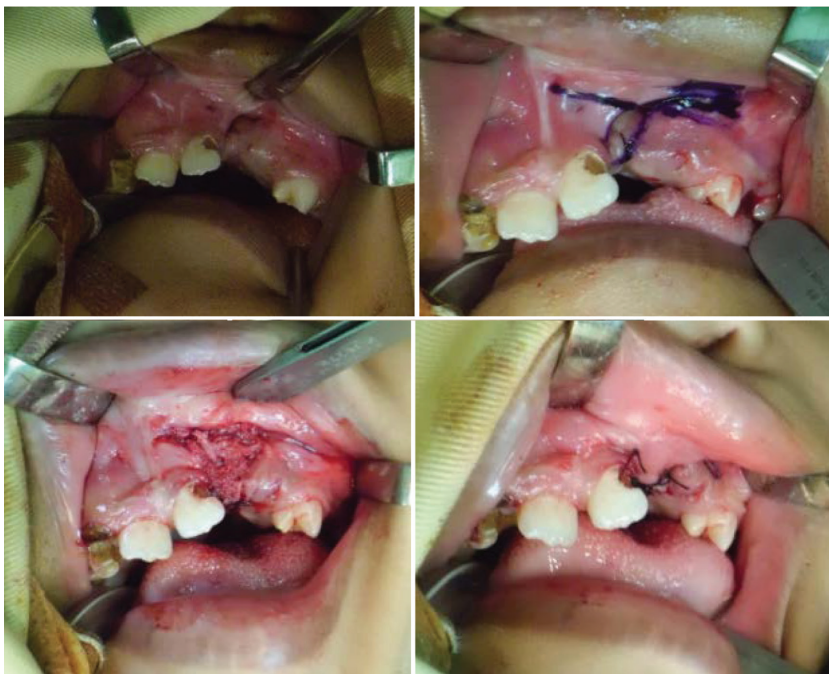


Figure 3 Alveolar cleft bone grafting sequence

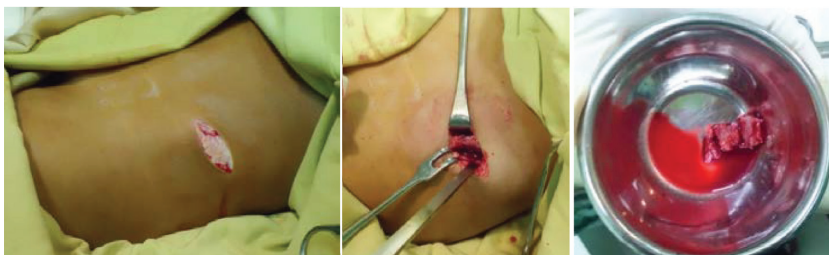


Figure 4 Autogenous iliac crest bone graft harvesting sequence

Case Report

A 9 year-old girl was admitted to Department of Oral and Maxillofacial, Hasan Sadikin Hospital, Bandung with the chief complaint of alveolar cleft at 21-23 region, so when the patient was drinking, the water was often out from the nose. The patient was born with cleft of the lip and palate. When the patient was 7 months old, the cleft lip was repaired and at 4 years old, the cleft palate was repaired. Currently the patient came back again with the purpose to close the alveolar cleft. Panoramic radiography was performed before the procedure [figure 1](#) and [2](#).

The surgical procedures were performed under general anesthesia and local infiltration of pehacain HCl on the buccal and palatal aspect of the alveolar cleft. An incisional design was made along the gingival sulcus on the labial side extending into the cleft and palate. An incision was performed according to the design, make a full-thickness mucoperiosteal flap, separating the nasal mucosa from the gingiva. Closure of the nasal floor mucosa was performed with a simple interrupted suture.

The orthopedic harvested anterior iliac crest bone graft with a minimal skin incision of 2 cm long. An osteotome was then used to obtain a block of iliac bone of 1.5x1x0.5 cm as graft. The surgical site was irrigated, then the wound was closed with suture. The bone graft was then packed into the alveolar cleft in 21-23 area, the oral mucosa was closed with interrupted suture and the wound was covered by periodontal pack for 7 days [figure 3](#) and [4](#).

For post-operative treatment, the patient was given antibiotic and analgesic. The patient was discharged a day after the surgery and was instructed to eat a soft diet for 1 week. The patient was also instructed to maintain oral hygiene with brushing her teeth using a soft brush and toothpaste a day after the surgery, and to do oral rinses with chlorhexidine after having meals for one week after surgery.

The patient was also instructed to return to clinic for a routine follow up visit. One week after surgery, the patient returned to the clinic with no complaint, the wound was cleaned with saline and the periodontal pack was removed [figure 5](#). At the second week after surgery, the patient returned to the clinic, and the suture was removed. The canine was erupting at the graft site [figure 6](#). Five months postoperatively, panoramic radiography examination was performed, for assessing and documenting quality of alveolar bone grafts [figure 7](#) and [8](#), then the patient was referred to an orthodontic to repair the teeth occlusion.



Figure 5 Intraoral image showed wound healing one week after bone grafting



Figure 6 Intraoral image two weeks after bone grafting. The left maxillary canine was erupting to the graft site



Figure 7 Intraoral image five months after bone grafting



Figure 8 Panoramic radiograph five months after bone grafting

Discussion

The alveolar cleft is common in a patient with cleft lip and palate. The alveolar cleft requires bony repair to allow proper eruption of dentition in a normal alveolar arch or the teeth can be moved orthodontically into it.^{3,7,11} In the present case, the alveolar grafting was done at 9 year-old, before eruption of the permanent canines, in order to provide better bone support for the canine to erupt and to support the lateral incisors.^{11,12}

At the present case, the alveolar cleft was closed using iliac bone graft, owing to its ease of access, and also it is easy to get an adequate amount of cancellous bone with a percutaneous incision.^{2,3} Cancellous grafts subjected to a rapid revascularization that allow more rapid union and the osteoblasts lay down new bone on old trabeculae which are later remodeled, that is important for the long-term result.^{10,13} The autogenous graft may restore tooth-bearing function.^{1,14} Only autologous cancellous bone creates bone that responds normally to eruption and orthodontic movement of teeth.¹⁰ This bone is highly cellular, making it resistant to infection and optimal for rapid healing.⁴

Autogenous cancellous bone graft has four important properties: osteoconductive matrix, that acts as a scaffold or framework into which bone growth occurs; osteoinductive factors (growth factors such as bone morphogenetic protein (BMPs) and transforming growth factor beta (TGF- β) that promote local factors to stimulate bone formation); osteogenic cells (include primitive mesenchymal cells, osteoblasts, and osteocytes) and structural integrity.¹³

The concerns associated with iliac bone harvesting is the possibility of effects on growth, hematoma and donor site morbidity. Those complications could be minimized with a careful surgical technique with a minimally incision and stripping of the muscular attachment on the iliac

crest, adequate hemostasis, careful wound closure and adequate postoperative pain control.¹

The surgery technique was conservative with a minimally incision and without an aggressive dissection to the periosteum at the ilium to minimize complication at the donor site.¹ Fresh autologous cancellous bone transforms very rapidly into alveolar bone. When autogenous cancellous bone is transplanted under optimal conditions, osteogenic cells in the graft will survive and new bone formation will start within a matter of days.¹⁰

Bone graft healing can be divided into five stages continuum: inflammation (chemotaxis activity stimulated by necrotic debris), osteoblast differentiation from precursors, osteoinduction (osteoblast and osteoclast function activity), osteoconduction (new bone forming over scaffold) and remodeling which process continues for years.¹³

Based on the clinical and radiographic development of the patient, the treatment for overall seemed success with the obtain of maxillary arch continuity, provide bone that is available for permanent canine to erupt, optimal alar base reconstruction, the fistulae was eliminated, provide a better nasal alar cartilage support, get a stabil the maxillary segment for orthodontic treatment, and obtain an ideal alveolar morphology.

Conclusion

In conclusion, the alveolar cleft closure using autogenous iliac crest for secondary grafting mostly used to obtain maxillary arch continuity, to provide available bone for permanent canine to erupt, to maximize alar base reconstruction, to eliminate labial and palatal fistulae, to provide nasal alar cartilage support, to stabilize the maxillary segment after orthodontic treatment, to provide a solid maxillary structure before orthognatic surgery and to provide substructure for dental implant insertion or other prosthetic rehabilitation.

Conflict of Interest

The Authors report no conflict of interest

References

1. Cho-Lee G, Garcia-Diez E, Nunes R, et al. Review of secondary alveolar cleft repair. *Ann Maxillofac Surg* 2013;3: 46-50.
2. Bartlett S, Ehrenfeld M, Mast G, et al. Congenital Deformities. Unilateral CLP-Alveolar bone grafting; 2013.
3. Berkowitz S. Cleft lip and palate diagnosis and management. 2nd Edition. Germany; 2006.
4. Redett R. Alveolar bone grafts; 2013.
5. Yoshida S, Suga K, Nakano Y, et al. Postoperative evaluation of grafted bone in Alveolar cleft using three-dimensional computed data. *Cleft Palate Craniofac J* 2013;50: 671-677.
6. Steinbacher DM, Padwa DL, Mulliken JB. Simultaneous harvesting of cancellous iliac bone for Alveolar cleft closure and dermis for augmentation median tubercle. *Cleft Palate Craniofac J* 2009;46: 295-298.
7. Goudy S, Lott D, Burton R, et al. Secondary Alveolar bone grafting outcomes, revisions, and new applications. *Cleft Palate Craniofac J* 2009;46: 610-612.
8. Fish J, Orth D. The clinical management of Postalveolar cleft palate infants. *J Dent* 1974;2: 239-146.
9. Akin Y, Ulgen O, Gencosmanoglu R, et al. Early Cheiloplasty. Its effects on Alveolar cleft. *Eur J Plast Surg* 1991;14: 164-167.
10. Eppley BL, Sadove AM. Management of Alveolar cleft bone grafting state of the art. *Cleft Palate Craniofac J* 2003;37: 229-233.
11. Miller LL, Kauffmann D, John SD, et al. Retrospective review of 99 patients with secondary Alveolar cleft repair. *J Oral Maxillofac Surg* 2010;68: 1283-1289.
12. Kazemi A, Stearns JW, Fonseca RJ. Secondary grafting in the Alveolar cleft patient. *Oral Maxillofac Surg Clin North Am* 2002;14: 477-490.
13. Brinker MR, Miller MD. *Fundamentals of Orthopaedics*. Philadelphia: WB Saunders; 1999. p. 7.
14. Balaji SM. Alveolar cleft defect closure with iliac bone graft, rhBMP-2 and rhBMP-2 with Zygoma Shavings: comparative study. *Ann Maxillofac Surg* 2011;1: 8-13.
15. DeLee, Drez, Miller. *DeLee and Drez's Orthopaedic sports medicine. Principles and practice*. 3rd ed. Saunders Elsevier.



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Cephalometric analysis for accurately determining the vertical dimension (case report)



CrossMark

Wahipa Wiro,* Ike D. Habar

Abstract

Objective: Determination of the vertical dimension of occlusion (DVO) tends to change throughout the human life. The vertical dimension is determined by the interocclusal point of the upper and lower teeth contact so the application is limited when the natural teeth were missing.

Methods: A 50-year-old female patient, partially edentulous on the upper and lower jaw with the remaining teeth were 12 (residual root), 11, 21, 23, 33 and 43. The remaining teeth were endodontically treated prior to the complete denture procedure. Cephalometric photo was done in patients after making bite rim, upper and lower bite rims were given metal markers, the image was traced, then measured between metal to get the vertical dimension of occlusion.

Results: Many functional and aesthetic changes occur in the whole orofacial region and stomatognathic system. DVO is one of the difficult stages in prosthodontic treatment. Most of the techniques to determine DVO in edentulous patients are based on soft tissue references, which can cause different measurements. Cephalometric analysis allows the evaluation of bone growth changes and can be used as a diagnostic tool in prosthodontics to evaluate the results of prosthodontic rehabilitation.

Conclusion: Tooth loss without replacement may cause alteration of vertical dimension. Measurement of VD is one of the important steps in making dentures.

Keywords: Cephalometric, Determining the vertical dimension

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Introduction

The relation of lower jaw and upper jaw can be seen in 2 directions for either in vertical or horizontal. Horizontal relation is a centric relation while vertical relation is vertical dimension (VD).¹

Tooth loss may cause the alteration of vertical dimension. This alteration occurs in hard and soft tissue of face and jaw region. Thus, there are many functional and aesthetic changes in all orofacial region and stomatognathic system. The exact determination of upper and lower jaw relation is important to be considered before determining the diagnosis or fabricating of the prosthodontic rehabilitation.^{2,3}

Vertical dimension is a relation determined by distance between upper and lower jaw, in specific condition such as occlusion, it is called occlusal vertical dimension (OVD), yet when resting it is called rest vertical dimension/physiology. Determination of OVD is determined by natural teeth when still exist in oral cavity and when occluded.⁴

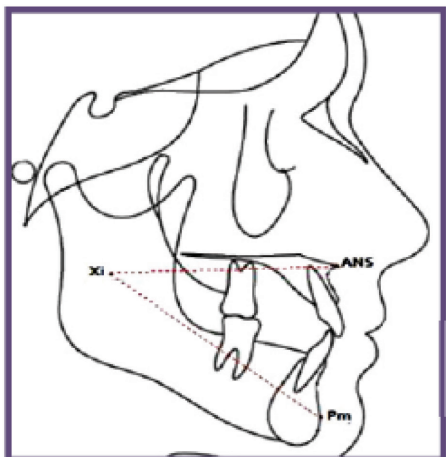
Vertical dimension can be restored with a denture fabrication. The stage of VD determination has been an important step in a successful treatment of removable denture because it can influence the phonetics as well as its function. The failure in

determining VD will cause many kinds of aberration such as: temporomandibular joint disorder, muscular dysfunction, atrophy and trauma of soft tissue, disturbance in phonetic, aesthetic, swallowing and chewing and alveolar bone resorption.^{4,5} Method used in the stage of DVI/DVF measurement till now has not been able to produce the most exact of DVI/DVF prediction although we know that this stage is very important to obtain a good occlusion.⁶ There are many kinds of determination of VD measurement, such as two dots, Willis bite gauge, swallowing, phonetics, biting forces and tactile. Although many advancements in prosthodontic, particularly in technique and material, however there is no method that does not have any weakness in producing patient's OVD.⁷

There are many measurement techniques of VD expected to be able to produce an accurate measurement of VD, however apparently some errors in measurement remain occurred.¹⁰ Continued error of measurement of VD may cause changes to the function and aesthetic of all orofacial region and stomatognathic system. Further, it will also increase the duration of treatment and will lead to a higher cost spent by the patient.

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- Xi = Central point of ramus
- ANS = Anterior nasal spine
- Pm = mental protuberance

Figure 1 Points of cephalometric analysis Morais Caregnato CH, Ornaghi B. Determination of final occlusal vertical, dimension by cephalometric analysis.



Figure 2 Intraoral photograph

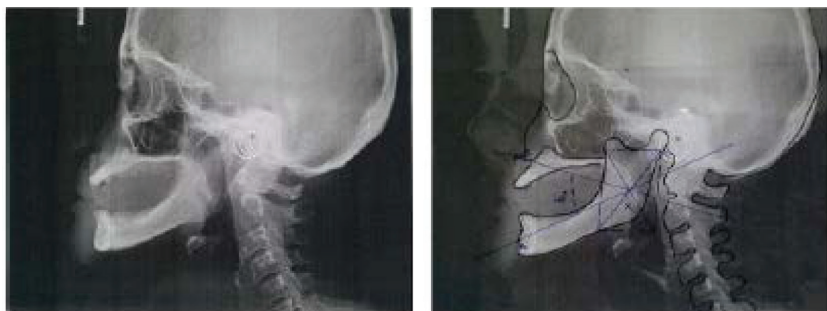


Figure 3 Cephalometric photograph without maxilla and mandibular bite rim, before and after tracing

Cephalometric analysis has been used as a measurement aid of VD and as a diagnosis in dentistry. Although it is generally used in orthodontic, the cephalometric in prosthodontic has also been widely used as an instrument to evaluate prosthodontic rehabilitation results. It is normally used to verify

the orientation of occlusal plane, spee curve, position, and incisal guidance of anterior teeth.⁸⁻¹²

Cephalometric photograph may help the measurement of VD thus it is possible to produce more accurate measurement of VD. Cephalometric analysis used in this case is a Ricketts analysis. Ricketts analysis is simple because it only uses 3 points: SNA, Pm and Xi points.¹¹

These were underlain authors to be interested in measuring VD with the aid of cephalometric photograph using Ricketts analysis. Additional costs can not be denied, however it may provide a more accurate and more satisfying measurement.

Purpose

The purpose of this study was to compare occlusal vertical dimension measurements between two-dot techniques and ricketts analysis using cephalometric photograph to get correct patient's VDO.

Case Report

A 50-year old female patient visited Dental Hospital, Department of Prosthodontic Hasanuddin University. She wanted to have denture, the patient had never worn any denture before, she felt difficult to eat and lacked of confidence because she lost many of her teeth. From intraoral examination there were partial edentulous of maxilla and mandibular, the teeth that lost were 17, 16, 15, 14, 13, 22, 24, 25, 26, 27, 37, 36, 35, 34, 32, 31, 41, 42, 44, 45, 46 and 47. The teeth that still exist are 12 (gangrene radix), 11, 21, 23, 33 and 43 with caries, extrusion, recession and lost of vertical dimension figure 1.

In radiograph examination it seems that there is bone lost in edentulous region of maxilla and mandibula. 12 (gangrene radix), 11, 12 and 23 are embedded within bone in more than a third of apical and 33 and 43 in a third of apical.

Management of case

Treatment plan for this case was fabrication of maxilla and mandibular complete denture. Primary impression done by using stock tray and irreversible hydrocolloid for edentulous, then fabrication of diagnostic cast were done. From the diagnostic cast, the custom tray was made. Pre-prosthetic treatment was endodontic treatment for the teeth that still exist. After endodontic treatment, the preparation of teeth crown and root canal with minimal depth of 3 mm were done to fabricate the coping. After the insertion of coping, cephalometric was taken, the result of this photograph was traced to measure vertical dimension of patient.

Individual tray was evaluated and adjusted in patient's mouth then border molding was done by using low fusing compound (green stick compound)



Figure 4 Occlusal plane photograph/orientation

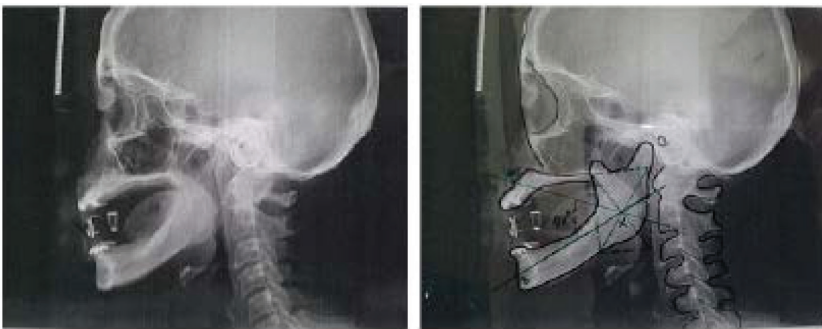


Figure 5 Cephalometric photograph with Ricketts analysis using maxilla and mandibular bite rim, before and after tracing

in all margins, both in upper and lower jaw. Secondary impression was fabricated by using polyvinyl siloxane of elastomer after border molding. After obtained the precise impression, result of secondary impression was then casted with stone to gain master cast. On the master cast, the base plate and bite rim made of baseplate wax were made. The base must attach precisely to master cast and bite rim must suit to arch. The height of base and bite rim of upper and lower jaw must be based on glabella-subnasion guidance = subnasion-gnathion = pupil-mouth corners. Base and bite rim of upper and lower jaw were tried in patient. Evaluation of the base stabilization was done by evaluating the thickness and the density of upper and lower base. The next step was the determination of orientation/ occlusal plane by adjusting the lower bite rim to upper bite rim. Adjusted the anterior part with pupil line and posterior part with chamfer line which pass through ala nasi to tragus/ porion with fox bite gauge. When adjustment, it is important to pay attention at the low

mouth thus coincided closely with base and bite rim lip line and labial fullness. The base and bite rim of lower jaw were adjusted inside patient's of upper jaw when occluded. Then, measurement of vertical dimension was done.

The measurement of vertical dimension in this case was started by measuring rest vertical dimension without bite rim of upper and lower jaw. The result of rest vertical dimension measurement was then reduced with free way space (2-3 mm) thus the measurement of occlusal vertical dimension was obtained. Bite rim of upper and lower jaw inserted to patient's mouth then adjusted with the result of occlusal vertical dimension which has been measured before, lower bite rim might be reduced, until determined occlusal vertical dimension was obtained. Determination of centric relation, fixation of bite rim of upper and lower jaw were done by using heated-paper clip. Before cephalometric photo, measurement of vertical dimension was done using two dots technique.

Cephalometric photograph was taken to measure occlusal vertical dimension by marking with paper clip mark on the base, the result of photograph were traced and measurement of occlusal vertical dimension according to Ricketts analysis were done.

If the desired angle has not been obtained, then it was possible to add or reduce the bite rim of lower jaw thus predetermined angle according to Ricketts analysis could be obtained. The next step was fabrication of complete denture once it was completed the next step was insertion of complete denture. Follow up was in 24 hours and 7 days after insertion of upper and lower complete denture.

Discussion

Lost/alteration of vertical dimension in this case was due to the patient lost many of her teeth and never replace it. The patient complained about difficulty in eating and speaking and she is not confident. Lost of natural teeth leads to lost of occlusal plane, vertical dimension (VD) and occlusion. To restore these functions it need to make complete denture with accurate measurement of vertical dimension.

Some methods in measurement of vertical dimension had been widely used, however there is still no appropriate method in measuring vertical dimension. Some studies used cephalometric photograph in measuring vertical dimension as well as restoring vertical dimension.^{10,12}

Occlusal vertical dimension in this case measured by using cephalometric photograph based on Ricketts analysis. Cephalometric photograph taken without bite rim, afterwards traced and measured the angle according to Ricketts analysis with ANS, Po and Xi points which obtained 40°.

After measurement of DVI, occlusal plane and vertical dimension were determined, then cephalometric photograph was taken with bite rim which was marked with metal inside patient's mouth. The result of cephalometric photograph is traced, that is 47°. If after tracing the result is more than 47°, reduce the height of mandibular bite rim. In contrary, if it is lower than 47°, increase the height of mandibular bite rim until the result of occlusal vertical dimension measurement is obtained.

The angle of 47° is an ideal angle to obtain occlusal vertical dimension.¹¹ Practice, there are still many errors in determination of OVD measurement thus the OVD may be higher or lower than the correct OVD. The OVD which is higher causes trauma to support tissues. Phonetic problems occur because of difficulty to occlude the teeth. When tooth is occluded it will produce sound (horse sound). It is not convenient to use and mastication muscles will be hurt (masseter), which may be taken as a sign. The aesthetic becomes bad because facial muscles becomes tense such as orbicularis muscle and this persists can cause disturbance in temporomandibular joint.¹³

When OVD is low, the corners of mouth appear less of support. Efficiency in mastication and aesthetic will reduce due to less support of lip and cheek. Protrusion will be occurred from chin when occlude the jaws.¹⁴ Clinical signs which will be seen as follows: A. Interocclusal distance is increased, B. Efficiency of mastication is reduced.⁷ Costen syndrome is occurred such as: A. light deaf, dizzy, tinnitus, painful when the joint is moved and pressed. B. Neurological signs will occurred: it feels like burn in tongue, throat, temporal region of head and disorder on saliva glands, thus secretion of saliva is reduced and mouth dry.³ Aesthetical signs that occur: A. A third of face will be shorter, B. Lip commissure is wider than usual, C. Face expression seems older.¹⁵

Continued error of measurement of VD, beside being able to cause changes in the function and aesthetic of all orofacial region and stomatognathic system, duration of treatment will increase thus it is being longer, this will cause the greater cost to be paid by the patient and sometimes it will make patient feels bored with multiple visits.

The addition of cephalometric photograph using Ricketts analysis provided a more accurate result in measurement of VD by obtaining a stable and retentive maxilla and mandibula complete denture, thus it can be used to fulfill better functions of mastication, speaking and aesthetic.

Conclusion

Tooth loss without replacement may cause alteration of vertical dimension. Measurement of VD is one of

important step in making denture. Continued errors in measurements of OVD may cause changes in the function and aesthetic of all orofacial region as well as stomatognathic system, thus duration and cost of treatment will increase. OVD measurements with the aid of cephalometric photograph using Ricketts analysis provides a more accurate result, thus it can be used in prosthodontic rehabilitation of cases with loss of VD. By using ricketts analysis we can restore previous patient's VDO. To make complete denture or removable denture which have lost VDO, we as prosthodontic specialist should using two dot technique to get VDO which be adapted with ricketts' analysis.

Conflict of Interest

The authors report no conflict of interest

References

1. Phoenix RD, Cagna DR, DeFreest CF. Stewart's clinical removable partial prosthodontics. 3rd ed. Chicago: Quintessence; 2003. p. 367-370.
2. Delic Z, Soskic MS, Grzic RP, et al. Evaluation of cranio-metric methods for determination of vertical dimension of occlusion. Coll Antropol 2000;1: 31-35.
3. Strajnic L, Sinobad DS, Marcovic D, et al. Cephalometric indicators of the vertical dimension of occlusion. Coll Antropol 2008;2: 535-541.
4. Zarb GA, Bolender CL, Hickey JC. Buku ajar prostodonti untuk pasien tak bergigi menurut Boucher. Jakarta: EGC; 1990. p. 214-239.
5. Rikmasari R. Pengukuran antropometrik bagian tengah dan bawah muka untuk menentukan dimensi vertical. Bandung: FKG UNPAD; 1999. p. 1.
6. Toolson LB, Smith DE. Clinical measurement and evaluation of vertical dimension. J Prosthet Dent 2006.
7. Mehta JD, Joglekar AP. Vertikal jaw relation as a factor in partial dentures. J Prosthet Dent 1969;2: 618-625.
8. Wirahadikusumah A. Analisis foto digital untuk memprediksi dimensi vertical fisiologis FKGUI. Jakarta; 2012. p. 2.
9. Tuncay OC, Thomson S, Abadi B, et al. Cephalometric evaluation of the changes in patients wearing complete dentures. A 10-year longitudinal study. J Prosthet Dent 1984;51: 169-180.
10. Basker RM, Davenport JC. Prosthetic treatment of edentulous patients. Copenhagen: Blackwell Munksgaard; 2002. p. 172-176.
11. Caregnato MCH, Ornaghi B, Paula A, et al. Determination of final occlusal vertical dimension Bycephalometric analysis. RSBO 2015;12: 143-150.
12. Ciftci Y, Kocadereli I, Canay S, et al. Cephalometric Evaluation of Maxillomandibular Relationships in Patients Wearing Complete Dentures: A Pilot Study. Angle Orthod 2005;75: 821-825.
13. Itjingsih WH. Geligi tiruan lengkap lepas. Jakarta: EGC; 1996. p. 69.
14. Beckket LS. Accurate occlusal relations in partial denture construction. J Prosthet Dent 1954;4: 487-495.
15. Sharry JJ. Complete denture Prosthodontic. 3rd ed. New York: McGraw Hill Book; 1974. p. 211.



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Early treatment of symphysis mandibular fracture in 12 years old children using erich arch bar: a case report



CrossMark

Syahril Samad,* Winarno Priyanto

Abstract

Objective: To explain the management of symphysis mandibular fracture in pediatric using erich arch bar.

Methods: A 12 years old boy has fracture in mandible due to the accident occurred when his chin hit the touching motorcycle tank. Clinically a deformity at the anterior of mandible and malocclusion has occurred. Patient also complained a pain with swelling and bleeding at the region of fracture and lip. Suturing had been done in wound area for both intra and extra oral area followed by the application of arch bar in maxilla and mandible. Doing evaluation at the third day, a vague

fracture line was found in panoramic radiograph.

Results: The following treatment done was the application of erich arch bar for mobility reducing the fracture of mandibular symphysis. A good healing act management to symphysis mandibular fracture of 12 years old children with full eruption of teeth has been given to the teeth to develop retention and to stabilize the erich arch bar.

Conclusion: Management of pediatric symphysis mandibular fracture for 12 years old children with full eruption of teeth using erich bar revealed a healed fracture.

Keywords: Symphysis mandibular fracture, Erich arch bar

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Introduction

Mandibular fracture is a major cause of oromaxillofacial injury on child trauma cases. The prevalence of fractures in boys is two times higher than girls. Dentoalveolar injuries occur about 60% to less than 5 years children although the cases rarely need hospitalization. In pediatric patients, about 40% fractures involve mandible and about 15 to 20% fractures of symphysis with the rare involvement of the mandibular ramus.

Oromaxillofacial fracture patterns in children vary in skeletal anatomy and social environmental factors. The general principle in the treatment of mandibular fractures in children and adults is the same, but the selection of the treatment in children depends on the age and the level of tooth development. In addition, maxillofacial fractures treatment in children is also associated with a psychological condition, physiological fracture, growth and anatomical characteristics of children.

The differences in the management of mandibular fractures in children are caused by several considerations, including anatomical variations, speeds healing, patient compliance and the potential for changes in growth and development of the mandible. Treatment becomes more difficult to do on deciduous teeth for the purpose of fixation as roots size is not good enough and can lead to resorption and imperfect eruption in permanent

teeth. It is associated with long-term aesthetic and functional rehabilitation of facial as the effects of the injury, so the performed treatment will give a huge influence for subsequent growth.

In pediatric patients, the ability of faster wound healing with fewer complications coupled with good tissue vascularization and blood vessels that supply the face can be an advantage. Additionally, through growth and adaptability processes in children, the damaged orofacial tissue repair and function recovery are better in children than adults.

One of the mandibular fracture treatment types in children is closed reduction using erich arch bar which aims to get the occlusion fixation and bony union.

Case Report

A 12 year-old pediatric male patient came with a broken lower jaw and was referred to the Department of Oral and Maxillofacial Surgery Emergency Room (ER) at Dr. Hasan Sadikin Hospital. From anamnesis, it was found that the patient had an accident about 2 hours earlier before hospital admission when he was driving a motorcycle at moderate pace in Karawang. Patients wore half face helmet as he had sudden lost of balance thus fell off with falling mechanism of chin hitting the motorcycle handlebar beforehand. After the incident, the patient was conscious. No nausea and

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Figure 1 Profile of extra oral and intra oral images

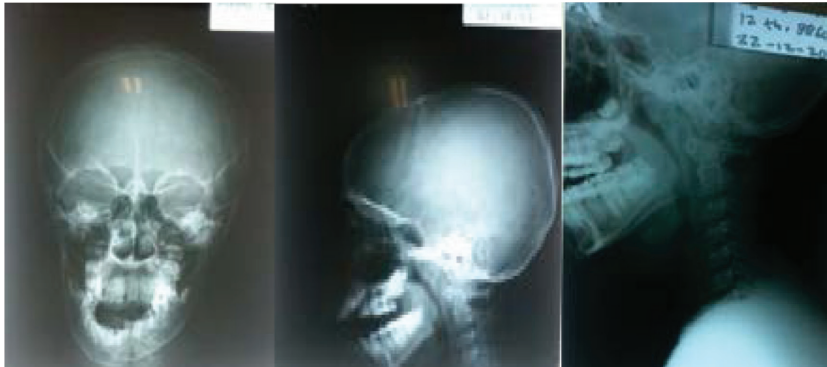


Figure 2 AP head plain, Lateral and servikal radiographs



Figure 3 Post IDW, A. Post extra oral suture, B. Post intra oral suture



Figure 4 3rd day post IDW panoramic radiograph



Figure 5 7th day and week 8 control images

vomiting were found. From anamnesis, bleeding and fracture on the front of the lower jaw were found [figure 1](#). Patient was then taken to Karawang General Hospital, infusion was installed, stitches in his chin and head x-rays were performed [figure 2](#). He was then referred to the ER at Dr. Hasan Sadikin Hospital, Bandung.

Based on the principles of ATLS, Primary survey was done with findings: A. Clear with C-spine protection, B. symmetrical chest shape and movements, right Vesicular Breath Sound was equal to the left, respiration 18 times per minute, C. Blood pressure 110/70 mm Hg, pulse 78 times per minute, D. with Glasgow Coma Scale (GCS15) (E4M6V5) measurements, isochoric pupils with diameter of 3 mm left equal to right, no light reflex disorder and no paresis. Secondary survey was within normal limits.

Extra-oral examination showed facial asymmetry with stitches on the chin with a size of 2 × 0.5 cm and on the lower lip with a size of 1 × 0.5 cm from the previous hospital. Intra-oral examination showed penetrating injuries at the lower lip with a size of 1 × 0.5 × 0.3 cm and the gum region of teeth 31-32 with a size 1 × 0.5 × 0.5 cm reaching to the underlying bone.

Blood tests showed results within normal range. An emergency action taken was observation of the general state of patients with GCS assessment, and vital signs, the position of the patient's head of 30 degrees, oxygenation with nasal cannula 2-4 liters per minute, infusion of NaCl 0.9% 1,500 cc per day, and a non-conservative treatment operation. Then it proceeded with the injection of anti-tetanus serum (ATS) and tetanus toxoid (TT), amoxicillin antibiotic of 500 mg IV, ketorolac analgesic of 30 mg and H2-blockers such as ranitidine of 50 mg.

The wound debridement was done using 0.9% NaCl mixed with gentamicin, using a ratio of 500 cc of 0.9% NaCl mixed with 2 cc gentamicin (10 mg/cc). Intraoral laceration wound was stitched using silk vicryl 4.0 and 4.0 and the extra oral wound laceration was sutured using nylon 6.0. Fixation was performed using Inter Dental Wiring (IDW) Erich Arch Bar on the upper and lower jaws of teeth 16-26 and 36-46 [figure 3](#). In order to follow the wound progress, panoramic x-ray then performed on day three after wiring procedures [figure 4](#). [Figure 5](#) shows the condition of wiring after a week and two months (IDW was removed).

Discussion

Mandibular fractures in children that commonly occurred in the hospital are the face and head fracture. The numbers of cases in boys are two times higher than in girls where the fractures are generally

caused by falls, blunt trauma and motorcycle accidents. High prevalence of mandible regions affected in children are the condyles, sub condyles and angulus (80%). Symphysis or parasymphysis is only affected 15-20%, while the ramus is rare affected region.

Factors that should be considered to determine the definitive therapy include age and patient cooperation, the duration between trauma and treatment, location or expansion of the area of injury, involvement of primary teeth or permanent, stage of root development, a fracture in the alveolar bone and the health of periodontal tissue on the teeth involved.

Management of oromaxillofacial emergency trauma patients should receive immediate attention in the respiratory tract, adequacy of ventilation, control internal and external bleeding.^{1,8,9} Primary survey assessment (ABCDE) is a priority therapy based on vital signs and mechanism of injury, life-threatening situation quickly recognized and resuscitation immediately performed. A preliminary analysis of all trauma patients is conducted based on Advance Trauma Life Support (ATLS) of the American College of Surgeons (ACS).^{6,8,9}

Examination of the airway in the patient in this case revealed a clear airway with C-Spine protection. If intra oral bleeding occurs, suctioning is done immediately so the airway is not interfered and obstruction can be prevented. Attempt to free the airway is done by keeping the airway away from intra oral bleeding and protecting the cervical spine.^{6,8,9}

Breathing, ventilation and oxygenation given by nasal cannula 2-4 liters per minute, good ventilation covering the good function of the lungs, chest wall and diaphragm are given. Each of these components was evaluated quickly. Circulation with 0.9% NaCl infusion of 20 drops per minute maintenance was done to keep the patient's hemodynamic situation stable and complete blood count and blood clotting factors were simultaneously performed. Three clinical findings that in seconds can provide information on the patient's hemodynamic state are the level of awareness, skin color and pulse.^{6,8,9} External bleeding cannot be found in these patients.

Disability and neurologic status in these patients were assessed by (GCS15) (E4M6V5) showing spontaneous eye opening with pupillary size and reactions showed no signs of lateralization, motoric function followed orders and good verbal communication.^{6,8,9} This patient was fully awake with GCS of 15.

Secondary examination in this patient survey was carried out by the principle of head-to-toe examination from head to toe, supporting procedures such as radiological and laboratory

examination could be done on this occasion. The examinations included anamnesis, extra oral physical examination, head and oromaxillofacial, and intra oral examination which covered the status localist and supporting tissues surrounding the teeth.^{6,8,9} Results of intra-oral examination showed fracture lines at the anterior region of the mandible.

Emergency Management of oral and maxillofacial surgery in these patients include general maintenance of the accompanied complications, a careful clinical examination, x-rays proper interpretation, determination of the type and kind of fracture. Furthermore, the treatment of soft and hard tissue injuries was done. Reduction, fixation and immobilization of fractures were performed using interdental wiring (IDW) erich arch bars. Simultaneous pain management and administration of antibiotics were administered.⁷⁻⁹ Administration of prophylactic antibiotics, bed rest with head elevation of 30 degrees were conducted in order to avoid circumstances that could lead to sudden increased intracranial pressure such as coughing, straining and sneezing.^{4,5}

Patients with a very young age and the low level of cooperation may complicate the management of post-surgical instructions causing the healing becomes longer. On the other hand, wound healing can be faster because it is supported by the presence of tissue vascularization and a good supply of blood vessels on the face. Moreover, with the process of growth and adaptability in children, repair of the damaged tissue and recovery of orofacial function in children are better than in the adults.⁹

Fractures with minimal displacement of bone in children can be treated with several technique variations, namely Tape Muzzles, circumferential wiring, acrylic splint, percutaneous skeletal fixation, open reduction, resorbable plates, orthodontic resins, modified orthodontic brackets, rubber elastics in combination with orthodontic and nickel titanium staples. In fractures with severe shifting, treatment options can vary from intermaxillary fixation, cap splints to coat with mini plate or resorbable plate.⁹⁻¹¹

Oromaxillofacial fracture treatment with anatomical reduction combined with adequate stabilization aims to obtain bony union. Healing and unification of bone fracture or injury occurs through several processes, A. The inflammatory phase with the invasion of neutrophils and macrophages, B. Osteoinduction, ie cells-precursor cells in endosteum: periosteum and surrounding tissues become osteoblasts followed by osteocon-duction, which the osteoblast entering the fracture area, C. The formation of callus which contains fibroblasts, osteoblasts and cells-other cells, D. Chondroblasts produce the

basic substance, the fibroblasts produce collagen and osteoblasts produce hydroxyapatite, E. Bone apposition and endochondral ossification, F. The formation of callus which consist of unorganized woven bone, followed by osteoclasts and osteoblasts remodeling into lamellar bone, G. Then, fracture is stiffly fixed and reduced, less callus formation and endochon-dral ossification, healing then proceeds mainly with apposition, H. After the remodeling is complete, structure of healed bone is the same with normal bone without scarring of the bone.⁹

Management of mandibular symphysis fracture in this case occur in a child with perfectly erupted permanent teeth except for tooth 15. The advantage of treatment with erich arch bar in this case is the support of adequate permanent dentition as anchoring accompanied with the development stage of roots that is almost complete, good periodontal tissues and the process of growth and adaptability in children. Therefore, the repair of orofacial damaged tissue and the recovery of its function in this case can give good results.^{10,11}

Metabolic management in children after surgery is more complex than in adults. Special attention should be given to the calories, fluids and electrolytes management, as well as blood transfusions. Management of comprehensive pediatric patient after oral and maxillofacial surgery is very important for better patient healing.^{10,11}

Conclusion

Emergency management of oromaxillofacial trauma in the emergency room needs special attention,

precise treatment and quick action. Management of mandibular symphysis fracture in children aged of 12 years old with the perfectly erupted permanent teeth using erich arch bar provides a good healing results.

Conflict of Interest

The authors report no conflict of interest

References

1. Pedersen GW. Buku ajar praktis bedah mulut. Jakarta: EGC; 1996.
2. Zollman FS. Manual of traumatic brain injury management. New York: Demos Medical; 2011. p. 25-31.
3. Satyanegara. Ilmu bedah saraf. 5th ed. Jakarta: Gramedia Pustaka Utama; 2014. p. 322.
4. Greenberg MS. Handbook of neurosurgery 7th ed. Canada: Thieme; 2010. p. 297-306.
5. Francis BQ, Quinn MS, Fractures BS. Grand rounds presentation the University of Texas medical branch in galveston. *J Otolaryngol* 2013; 1-7.
6. Cedera kepala dalam american college of surgeon. Advance trauma life support. USA: First Impression; 1997. p. 196-235.
7. Engin DA, Solakoglu AG, Komut E, et al. Assessment of maxillofacial trauma in emergency department. *World J Emerg Surg* 2014;9: 1-7.
8. Booth PW, Eppley B, Schmelzeisen R. Maxillofacial trauma and esthetic facial reconstruction. 2nd ed. Saunders; 2013. p. 28-58.
9. Raymond JF. Oral and maxillofacial trauma. 4th ed. St. Louis Missouri: Saunders; 2013. p. 2.
10. Vellore, Krishna et al. Circummandibular wiring of symphysis fracture in a five year old child. Case report in dentistry. Hindawi: Publishing Corporatio; 2013.
11. Sharma, Sunli. Pediatric Mandibular fracture : A Review. *IJCPD* 2009;2: 1-5.



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Overjet problems at the growing child, case report using the twin block appliance



CrossMark

Muhammad H. Achmad*

Abstract

Objective: Using a twin block appliance to treat overjet problem in growing child.

Methods: Twin-block consists of maxilla and mandible blocks bite with retention 0.7 mm adams clasped on permanent first molars and 0.9 mm balls clasped placed on maxillary and mandibular incisors embrasures. Passive maxillary bow labial used for anterior retention and control the incisors proclination. Lateral expansion of maxillary arch was achieved by expansion screw-controlled once a week. The patient was instructed to use appliance for 24 hours a day, wear and remove the maxillary

and mandibular twin-block by himself, activate the screw expansion twice a week and followed up every three weeks. The patient was also instructed to oral hygiene maintenance especially around the covered acrylic plate region.

Results: Patient's profile shapes was improved after 7 months treatment. Crowding mandible reduced by proclination of mandibular incisor, normal occlusion with optimum overbite as well as overjet could be achieved.

Conclusions: Twin block appliances was successfully treat the overjet problem in this patient.

Keywords: Overjet, Growing child, Children malocclusion, Twin Block.

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Introduction

Malocclusion involves complex influence between genetic factors and environmental factors. Inherited mandible growth pattern (genetic) leads the chin to grow downward and backward which can be a predisposing factor of malocclusion. Environmental factors such as a habit, oral habit, the movement of soft tissue and early tooth loss can contribute to malocclusion. Sucking persistently (thumb sucking) over 4 years old related to high prevalence of increased overjet and the relationship class II of caninus and molar.^{1,2} Unbalanced force of oral soft tissue, such as tongue thrust habit, low tonicity of muscle lips and bad tongue rest position can lead to the displacement tooth position due to change in balance. Early tooth loss, especially in maxillary primary molar causes mesial drifting on maxillary permanent molar, hence it can also be a local factor affecting the development of malocclusion class II.² Parents' education, birth rate, social and economy status, effect of breastfeeding duration to sucking habit and diet influence affects teeth malocclusion on growing children.^{3,4}

Overjet is a horizontal relationship between maxillary and mandibular incisors. Normal range of overjet is 2-4 mm. Increased overjet is marked by protrusion of maxillary incisors. Overjet size over 6 mm can impact on psychology and social burden in children as a result of the aesthetic on

child's face profile shapes. Increased overjet related to class II malocclusion is usually accompanied by class II skeletal sagittal relationship and retrognathia of the mandible.^{1,3,4}

Overjet which is part of class II division 1 malocclusion is related to two fundamental things about the diagnosis of malocclusion. Increased overjet is the main characteristics of the diagnosis of class II division 1 malocclusion. Further, an increased overjet as the characteristics of the diagnosis of class II malocclusion is a risk factor of trauma in maxillary incisor. This problem based on a critical assessment result of several randomized clinical studies in last 15 years about the treatment results of class II malocclusion which explains that increased overjet could define class II malocclusion. The claim of several research reveals that prevention of trauma on maxillary incisors is seen as an indication for early treatment of class II malocclusion.^{3,4}

In Angle classification based on occlusal pattern, increased overjet which is a characteristic of the diagnosis of class II division 1 malocclusion is related to maxillary skeletal relationship, anterior teeth protrusion and mandibular skeletal retrusion. Increased in overjet can be found as an orofacial disharmony on someone's face who has thumb or lips sucking habit that is usually accompanied by lips incompetence. That increased overjet is a significant characteristic of occlusal that is related

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to dentoskeletal of class II division 1 malocclusion.^{2,5,6}

Effects of Increased Overjet

a. Anterior Trauma^{1,2,4}

Clinical problems related to increased overjet is an association with the incidence of trauma on the permanent incisors during growing age. Increased prevalence of trauma on maxillary incisors is correlated with the class II division 1 malocclusion (increased in overjet). In a systematic review of the relationship between increased overjet and trauma on maxillary incisors, it was found that children with overjet over 3 mm had two fold risk of trauma on the anterior teeth compared to children with smaller overjet. Children about the risk of trauma on maxillary incisors increased by 13% along with increased overjet. There are statistically significant relationship between the increased overjet and trauma on teeth, children with class II malocclusion have 64% opportunities on teeth trauma. Teeth trauma observed such as tooth fracture occurs three times higher on child with the case of increased overjet, so it is important to seek malocclusion prevention and treatment. Educational counseling is needed to reduce bad habits that can cause malocclusion (overjet increasing) as an effort to minimize the prevalence of teeth trauma in children.

b. Tissue damage^{1,9,10}

Teeth fracture is related to overjet greater than 6 mm. Incidence of incisors trauma were high in boys than girls (boys:girls, 2:1). A child with overjet greater than 8 mm tends to show lost bone support compared to someone with overjet in the normal range. Periodontal damage occurs along with increased age, periodontal ligament becomes less resistant to atypical pressure lips related with normal lips closure difficulty. Harmonization of the incisors relationship during growing age can contribute to prevent teeth migration in older age. Increased overjet is related to increased plaque accumulation and gingivitis.

c. Social effects^{1,9,11}

Several studies show the social impact on a child who has excessive overjet. Overjet increasing condition is considered as unattractive look, overjet greater than 6-9 mm results mockery, rejection, a joke, pity, curious reaction and unnatural gaze from other people around patients. Protrusive upper teeth (convex face) is being the reason of closure lips difficulty, could be a shameful thing for many children. It has been the reason for parents to

seek orthodontic treatment for their child. Reasons for those conditions are: aesthetic, increased risk of maxillary incisors trauma, likely increased periodontal problems and decreased chewing ability.

d. Symptoms of temporomandibular joint disorder^{1,9,10}

Increased overjet is related with the signs and symptoms of temporomandibular disorder (TMD). Overjet >5 mm is correlated with TMD. The impact of increased overjet on temporomandibular joint's function occurs because of less contact on incisors, much mandible movement and pressure on the muscle mastication. The larger the space on centric occlusion (teeth relation when the jaw on the rest position) the more maximum contact exists between the cusp (occlusion habit regardless of the location condyle) and this results to one of the symptoms of temporomandibular joint function called the orthopedic instability.

Orthopedic instability caused by centric occlusion deflection is one of the important thing on TMD etiologic factor. Changed muscle tension and tone is influenced by the amount of centric occlusion space to maximum contact between the cusp, especially if it is asymmetric. Patients with large overjet show significant difference on condyle position on mandibular fossa when in centric occlusion position and centric relations compared to patients with normal overjet. Practitioners should give special attention on temporomandibular joint status of patient with large overjet.

Management

There are two options to lower increased overjet: Labial segment retraction of maxilla and labial segment development of mandible. Preferred choice will depend on factors relating to the skeletal pattern, soft tissue, as well as the age of patients. Options to reduce the increased overjet can be by using removable appliance, functional appliance which aims to change dental and skeletal relation, fixed orthodontic appliance for tipping, and bodily movement by repositioning the jaw through orthognathic surgery.^{1,8,9}

Management with the Twin-Block functional appliance

Twin-block functional appliance developed by Clark is functional appliance that has been widely used for class II malocclusion treatment especially in efforts to reduce large overjet. This appliance can be used in a long time that allows movement on the mandible, easy to use, patients can be cooperative. However to get maximum treatment results depends good cooperation of each patients.



Figure 1 Clinical photograph of patient's face profile before treatment



Figure 2 Intraoral photograph before treatment



Figure 3 Cephalometric radiographs

This appliance is widely used for child treatment especially at the growing age. Using twin-block functional appliance shows that the early treatment can reduce overjet effectively, change form

of skeletal pattern, as well as increase in child's psychology such as: confidence along with aesthetic improvement on children's face significantly.^{7,8,10}

Case Report

A 12 year old boy came to Dental Hospital, Department of Pediatric, Faculty of Dentistry, Hasanuddin University, Makassar, Indonesia with chief complaint that front teeth of upper jaw more forward [figure 1](#) and [2](#). Treatment plan: planning treatment on anteroposterior plane with removable appliance (twin-block removable). Treatment purpose of this case was to correct relation between maxilla and mandible become class I.

Twin-block consists of maxilla and mandible blocks bite with retention 0.7 mm adams clasped on permanent first molars and 0.9 mm balls clasped placed on maxillary and mandibular incisors embrasures. Passive maxillary bow labial used for anterior retention and control the incisors proclination. The plane side sharp interlocked around 70° to the occlusal plane. Lateral expansion of maxillary arch was achieved by expansion screw-controlled once a week. Block reactivation was done as needed. The patient was instructed to use appliance for 24 hours a day (except for the contact sports and swimming).

Treatment Progress

Each stage progress of this functional treatment was achieved because of patient's cooperation [figure 4](#). These treatments completed for 7 months. Maxillary incisor retroclined 9° while the mandibular incisor proclinated 4°. This achievement resulted in reduced overjet [figure 5](#). Patients were instructed to wear and remove the maxillary and mandibular twin-block by himself and instructed to activate the screw expansion twice a week and followed up every three weeks. The patient was also instructed to oral hygiene maintenance especially around the covered acrylic plate region. Patients needed to clean plate or twin block appliance after eating because the food will usually accumulate under the plate, cleaning thoroughly using a toothbrush and toothpaste then rinsed with cold water.

Treatment Results

After functional correction by positioning mandible forward, patient's profile showed harmonization increased of the face balance [figure 4](#) normal occlusion with optimum overbite and overjet could be achieved [figure 5](#). Patient was satisfied with facial profile, which has changed from convex to normal.

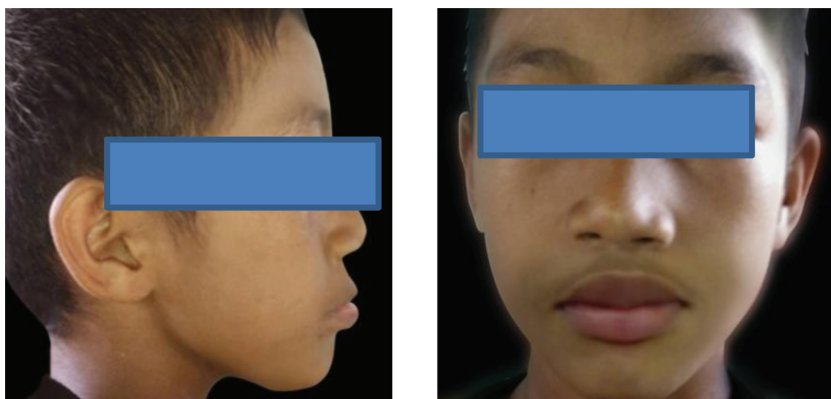


Figure 4 Clinical photograph of patient's face profile after treatment



Figure 5 Intraoral clinical photograph after treatment



Figure 6 Clinical photograph changes in patient's face profile



Figure 7 Intraoral clinical photograph before and after treatment

Cephalometric analysis showed mandible position forwardly, maxilla growth restriction and good interincisal angle.

Treatment results showed patient's profile shapes has improved after treatment [figure 4](#). Crowding mandible reduced by proclination of mandibular incisor. At the end of treatment showed class I incisors, canine and molar relation [figure 5](#). Overbite and overjet was reduced. Developmental changes is shown in [figure 6](#) and [table 1](#).

Table 1 Cephalometric tracing changes before and after treatment

| | Before | Rata2 | After |
|-----------------|--------|-------|-------|
| <SNA (*) | 76 | 82 | 79 |
| <SNB (*) | 71 | 80 | 74 |
| <ANB (*) | 5 | 2 | 3 |
| 1 ke NA (mm) | 9 | 4 mm | 6 |
| <1 ke NA (*) | 36 | 22 | 30 |
| 1 ke NB (mm) | 3 | 4 mm | 5 |
| <1 ke NB (*) | 26 | 25 | 23 |
| <Pg ke NB (mm) | 3 | 2 mm | 3 |
| <1 ke 1 (*) | 113 | 131 | 124 |
| <OkI ke SN (*) | 25 | 14 | 19 |
| <GoGn ke SN (*) | 37 | 32 | 35 |

Discussion

Characteristics class II skeletal and dentoalveolar malocclusion in patients with large overjet become important reason of early treatment necessity to control amount and direction of mandible growth using ideal functional appliance on this case. Malocclusion prevention and treatment study, as well as health care policy should be included in a corrective treatment for malocclusion. Educational program will ease the guide and reduce bad habits which can cause malocclusion (increased overjet). Teeth trauma in children is often associated with aesthetic, psychological, social problems and therapy. Therefore, it requires more efforts to health improvement and prevention strategies implementation to reduce the level of teeth trauma on preschool children.^{4,7,12}

Twin-block functional appliance has several advantages including the fact that it is well accepted by the patient, strong, repaired easily and suitable for mixed dentition period and permanent teeth. Size of this appliance is easy touse by the patient so that speech interference could be minimized. Treatment purposes can be achieved due to the patient's cooperation. Reduction overjet with functional appliance results to better patient's confidence and minimize the risk of trauma on the maxillaryincisors.^{8,12,13}

The selection of functional appliance depends on several factors, such as patient's age and the level of cooperative, habit factors as well as the availability of laboratory facilities. During the treatment, the SNA value was reduced 1° while the SNB value was increased 1°. As a consequence ANB value decreased 2° resulted in class I skeletal pattern.

Maxillary incisor inclination reduced to 116°. Mandibular incisor was proclined 4° vertical.

Proclining mandibular incisor used capping acrylic was reported to reduce amount of proclination maxillary incisor. Mandibular molar moved to mesial. It has been shown in the literature that the functional appliance does not make long term skeletal changes and most of all effects result in dentoalveolar. However, it can be seen in this case that the functional appliance allows fixed appliance stage to achieve good results. In this case, patient's profile is improved. Arrangement have been made to control patient's development regularly during treatment stage. Similarly, use of retention such as Hawley retainer required to ensure stability.^{12,13}

Conclusion

Twin block appliances was successfully treat the overjet problem in this patient.

Conclusion

Twin block appliances was successfully treat the

References

- Baccetti T, Giuntini V, Vangelisti A, et al. Diagnostic performance of increased overjet in class II division 1 malocclusion and incisor trauma. *Prog Orthod* 2010;11: 145-150.
- Turasi B, Demirkaya AA, Biren S. Comparison of increased overjet cases and controls: normative data for condylar positions. *J Oral Rehabil* 2007;34: 129-135.
- Jabbar NSA, Bueno ABM, Silva PED, et al. Bottle feeding, increased overjet and class 2 primary canine relationship: is there any association?. *Braz Oral Res* 2011;25: 331-337.
- Antunes LAA, Gomes IF, Almeida MH, et al. Increased overjet is a risk factor for dental trauma in preschool children. *Indi J Den Res* 2015;26: 356-360.
- Wagner Y, Weltzien RH. Occlusal characteristic in 3 years old children-results of a birth cohort study. *BMC Oral Health* 2015;15: 1-6.6.
- Antoniou C dan kawan-kawan. Class II Division 1 Malocclusions-early diagnosis & management part. Australian Society of Orthodontist. www.aso.org.au; 2010. p. 1-4.
- Ramesh N, Guranthan D, Khartikeyyan SA. Association of nonnutritive sucking habits and Malocclusion: a cross-sectional study. *Int J Pedodont Rehab* 2016;1; 15-18.
- Denny JM, Weiskircher MA, Dorminey JC. Anterior open bite dan overjet treated with camouflage therapy. *Am J Orthop* 2007;131: 670-678.
- O'Brien K, Wright J, Conboy F, et al. Early treatment for Class II division 1 malocclusion with the twin-block appliance: A multi-center, randomized, controlled trial. *Am J Orthod Dentofacial Orthop* 2009;135: 573-579.
- Puri T, Patel D. Skeletal Discrepancy Correction In Class II Div 1 Malocclusion Using Fixed Twin Blocks. *IOSR JDMS* 2014;13: 65-67.
- Sood S. Treatment of Class II division 1 Malocclusion in a non growing patient. *VJO* 2010.
- Gupta S, Kumar-Jindal S, Bansal M, et al. Prevalence of traumatic dental injuries and role of incisal overjet and inadequate lip coverage as risk factors among 4-15 years old government school children in Baddi-Barotiwala Area, Himachal Pradesh, India. *Med Oral Patol Oral Cir Bucal* 2011;16: 960-965.
- Saltaji H, Flores-Mir C. The relationship between vertical facial morphology and overjet in untreated Class II subjects. *Angle Orthod* 2012;82: 432-440.



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Surgical management of necrotizing fasciitis due to odontogenic infection with sepsis: a case report



CrossMark

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Lucky Riawan

Abstract

Objective: To perform surgical operation on necrotizing fasciitis due to odontogenic infection with sepsis.

Methods: In this case an odontogenic infection was accompanied by a large open wound on the face and sepsis. Patient was hospitalized in the Dr. Hasan Sadikin General Hospital. Management of this patient in the emergency room were administration of appropriate broad-spectrum empiric antibiotic, incision, pus drainage and extraction of the infected tooth, followed by fluid resuscitation with strict observation. Surgical debridement was then performed.

Results: After being treated for 12 days the patient's condition improved. We planned closure of defects of the facial area, but the patient refused.

Conclusion: Necrotizing fasciitis is an uncommon but potentially lethal condition associated with high rates of morbidity and mortality. Early diagnosis coupled with emergent surgical debridement, appropriate broad spectrum empiric antibiotic treatment and a multidisciplinary team approach is essential for successful treatment.

Keywords: Necrotizing fasciitis, Odontogenic infections

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Introduction

Necrotizing fasciitis is an aggressive infection that affects the superficial fascia with undermining of the overlying soft tissue. The process usually occurs in the fascia of the trunk and extremities but can be seen in the maxillofacial region. The disease usually occurs in patient who are chronically debilitated, those with diabetes mellitus or in patient with small-vessel disease. Various terms including hospital gangrene, gangrenous erysipelas, hemolytic streptococcal gangrene, have been used to describe this disorder.¹

We report a case of necrotizing fasciitis due to odontogenic infection with sepsis. Early diagnosis combined with emergent surgical debridement, appropriate broad-spectrum empiric antibiotic treatment and a multidisciplinary team approach are essential for successful treatment of necrotizing fasciitis.²

Case Report

A 51-year-old female patient came to the emergency department of Dr. Hasan Sadikin General Hospital complained redness and swelling in the right cheek with rapid breakdown of skin and pus. About 1 month before admission, the patient felt pain on her first inferior right molar tooth. A week later, inferior right submandibular swelling appeared,

the patient checked herself to general practitioner in Buahbatu clinic and received 4 kinds of medicine (patients forgot the name) but the condition did not improve and patient felt swelling became larger and extended to the cheek accompanied with fever. Patient then checked to another general practitioner, and received medicine (patient forgot the name and type of medicine). Because the patient's condition did not improve, 3 days before admission, the patient went to another general practitioner for treatment, and then referred to the Ujung Berung Hospital. In the Ujung Berung Hospital, she was initially administered the injection of ketoro-lac and blood tests in the laboratory and then the patient was transferred to the emergency department of Dr. Hasan Sadikin General Hospital. Patient complained difficulty of eating. The patient has a history of uncontrolled diabetes mellitus (last controlled 2 months ago) and hypertension.

On physical examination, the patient looked ill with signs of severe sepsis, blood pressure of 100/70 mm Hg, respiratory rate of 25 bpm, heart rate of 95 bpm, and temperature 36.5° C. On extra-oral examination, there were asymmetrical face with buccal swelling extended into the right submandibular, right periorbital, right retroauricular and right temporal region. On palpation, marked tender edema, painful on pressure, hyperemia, feverish

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Figure 1 Patient's profile



Figure 2 Intra oral

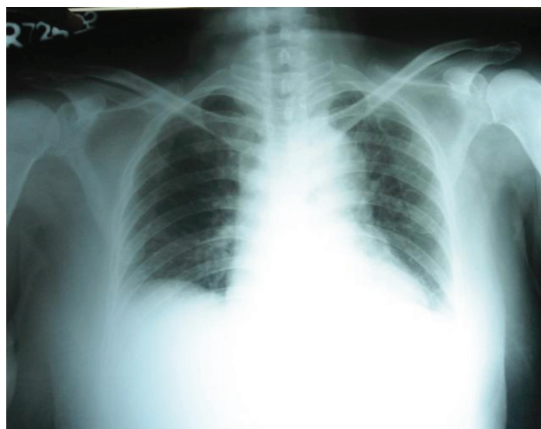


Figure 3 Chest X-rays

and fluctuate. The patient's right ear lobe was lifted. On examination of the eyes, appeared icteric sclera with non-anemic conjunctiva. The right submandibular lymph nodes could not be assessed, while in the left submandibular palpable and painful. On the right submandibular region appeared fistula formation around the necrotic tissue along with pus discharge spontaneously [figure 1](#).



Figure 4 Source of infection tooth

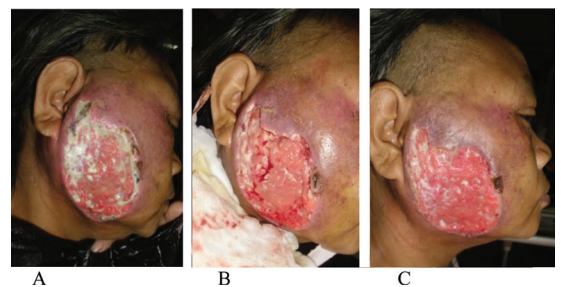


Figure 5 A. Day 4; B. Day 6; C. Day 10

were within normal range but gingiva appeared edema and hyperemia. Patient's tonsil could not be assessed because of mouth opening limitation, approximately 1cm. On examination of the teeth,



Figure 6 1 year

On intra-oral examination, lip, vestibulum, mouth floor, buccal mucosa, tongue and palate founded pulp necrosis in the first inferior right molar tooth. Oral hygiene was very poor with plaque and calculus deposited in the entire region of the maxillary and mandibular teeth [figure 2](#).

Laboratory work showed leukocytosis, increased lactate level, hiperuremic, hyponatremic, hypercalcemic and high glucose level. Blood gas analysis showed respiratoric alkalosis, low CO₂ pressure indicating hypoventilation. CXR indicated absence of active pulmonary tuberculosis, and cardiomegaly [figure 3](#).

Patient was diagnosed sepsis with necrotizing fasciitis due to right buccal abscess extended to

the right submandibular, right retroauricular, right infraorbital and right temporal region with type 2 diabetes mellitus and neuropathy complications. The patient was then consulted to Internal Medicine department due to high glucose level of 470 mg/dL, before underwent necrotomy debridement and source control. Further advices from Internal Medicine department suggested bed rest, liquid diet via NGT low salt DM 1500 kcal/day, 1 g protein/kg/day, carbohydrate:fat = 60%:40%, infusion of NaCl 0.9% in 2000 cc/24hr, novorapid insulin subcutan administration 6-6-6 unit, checked pus culture resistance, blood bulyon culture examination, KCl 25 mEq in 500 cc RL, lipid profile examination, uric acid, sodium, potassium and dag curve. Debridement and antibiotics in accordance with plan department of oral and maxillofacial surgery, accompanied by observation of vital signs.

In this emergency unit Department of Oral and Maxillofacial Surgery, the patient was administered antibiotics ceftriaxone 1 g, metronidazole 500 mg, ketorolac 1 ampoule and ranitidine 1 ampoule intravenously. Extraction of first inferior right molar tooth was performed to eliminate the source of infection and intra oral drainage [figure 4](#). Further examination of bacterial culture and drug sensitivity was tested.

Patient then hospitalized and administered liquid diet via NGT low salt DM 1500 kcal/day, 1 g protein/kg/day, carbohydrate:fat = 60%:40%. Wound was treated with gauze, compressed and moist replacement of NaCl 0.9% and povidoneiodine.

From resistance culture examination grew *Klebsiellapneumoniae* which was sensitive to amikacin, amoxicillin-Clav, cefepime, cefotaxime, ceftazidime, ceftriaxone, ciprofloxacin, cotrimoxazole, gentamycin, imipenem, levofloxacin, meropenem, piperacillintazobactam and tigecyclin. Administration of antibiotic ceftriaxone was appropriate with culture result and patient's condition improved, indicated by decreased level of leukocytes compared to first time came to the hospital and the injuries on the cheek region began to dry with reduced pus production [figure 5](#).

On day 10, general condition improved as indicated by blood pressure 130/90 mmHg, heart rate 65 bpm, temperature 36.2°C, and respiratory rate 16 minute. On day 12, signs of infection were gone and no pus found in the wound, the patient was referred to Plastic Surgery department to plan closure of large defects in the cheek region [figure 6](#).

Discussion

Necrotizing fasciitis is an aggressive bacterial infection of subcutaneous tissue and fascia.

Although it usually presents in the abdominal wall and extremities, there are several reported-cases of necrotizing fasciitis in the head and neck. The incidence is approximately 4 of 1000 cases of necrotizing fasciitis per year. When necrotizing infections involve the head and neck, it is termed craniocervical necrotizing fasciitis (CCNF) and is associated with significant morbidity and mortality usually due to septic shock, disseminated intravascular coagulation (DIC) and organ failure.³

In the prehyperbaric oxygen (pre-HBO) era, standard of care included early recognition of the disease, aggressive antibiotic treatment and repetitive surgical debridement.³

The clinical manifestations usually begin rather quiescently, the affected area becomes swollen and erythematous and the patient has a low-grade fever. The site deteriorates rapidly with sudden pain, worsening of the erythema, edema and generalized toxicity. As the disease progresses, the pain subsides as cutaneous nerves become necrotic and anesthesia of the area may occur. The skin overlying the infected fascia becomes dusky with purple mottling. Gas may form under the skin, which may be palpable. If the edges of the affected tissue are probed at this stage, the instrument passes into the plane that the infection is creating between the fascia and the overlying skin. Bullae form as the skin begins to necrose as a result of thrombosis of nutrient vessels as they pass through areas of involved fascia. Frank gangrene of the skin eventually occurs with sloughing of the skin, exposing the underlying necrotizing fascia and subcutaneous fat.⁴⁻⁷

Systemic manifestations include signs of sepsis, hemolysis and intravascular volume depletion. The patient has high fever, tachycardia, apathy, weakness and nausea. Anemia, jaundice and hemoglobinuria occur as a result of bacterially induced hemolysis. The patient is hypotensive with decreased skin turgor as a result of fluid losses caused by diaphoresis and extracellular fluid accumulation in the infected site. The overall mortality rate of necrotizing fasciitis is approximately, 30%. however, if the diagnosis is made promptly and treatment is begun early in the disease course, death occurs much more rarely.⁸

Although necrotizing fasciitis historically was thought to be caused by hemolytic streptococci and *S. aureus*, modern culture techniques have revealed that anaerobes usually are present in the wound. In addition, gram-negative bacteria frequently are present. Therefore early culturing of areas involved by the infection is important to help guide therapy.⁴

Therapy of necrotizing fasciitis involves management of both the local and systemic problems. Laboratory evaluations of hematocrit, started.

A central venous serum electrolyte levels, including calcium and myoglobin, should be made. Blood for culturing should be obtained before antibiotic therapy is line is helpful to allow determination of intravascular volume and rapid administration of crystalloids. The patient should be taken to the operating suite quickly to begin debridement. Surgery usually involves opening the infected planes widely, resecting frankly necrotic tissue and packing the area under the undermined skin loosely with gauze. Daily debridements then are started to continue to remove any devitalized tissue.⁶ Frozen-section biopsies can assist in guiding resection.⁹

High doses of intravenous antibiotics should be started empirically with agents chosen to cover hemolytic streptococci, staphylococcal organisms, gram-negative bacteria and anaerobes. A combination of penicillin, clindamycin and an aminoglycoside should be effective until the results of culture and sensitivity testing allow a more specific antibiotic regimen.⁵ Use of frozen-section biopsy of suspected necrotizing fasciitis is a valuable technique for more rapid diagnosis of this disorder.¹⁰ Some investigators have reported that hyperbaric oxygen treatment has a favorable effect on the diseased tissue.⁵ Once the infection has resolved, the overlying skin eventually begins to adhere to the underlying fascia and any areas of skin loss as a result of gangrene can be grafted temporarily with porcine skin or grafted permanently with meshed autogeneic skin. Punch biopsies to quantitate tissue bacterial counts can be used before grafting. The graft should not proceed until fewer than 10^5 bacteria per gram of tissue exist. Topical sulfadiazine (sulfadene) can be applied to exposed areas to help clear bacteria.¹¹

Conclusion

Necrotizing fasciitis is an uncommon but potentially lethal condition associated with high rates of morbidity and mortality. Immunodeficiency, multiple medical comorbidities and intravenous drug abuse have been implicated as risk factors. A high index of suspicion is required since a patient's initially benign clinical condition can rapidly deteriorate with the development of sepsis, multiple organ failure and death. Early diagnosis coupled with emergent surgical debridement, appropriate broad-spectrum empiric antibiotic treatment, and a multidisciplinary team approach is essential for successful treatment.²

Conflict of Interest

The authors report no conflict of interest

References

1. Stoneback JW, Hak DJ. Diagnosis and management of necrotizing fasciitis. *Orthop J* 2011;34: 196-202.
2. Mao JC, Carron MA, Fountain KR, et al. Craniocervical necrotizing fasciitis with and without thoracic extension: management strategies and outcome. *Am J Otolaryngol* 2009;30: 17-23.
3. Gaukroger MC. Cervicofacial necrotizing fasciitis. *Br J Oral Maxillofacial Surgery*. Infections of Soft Tissues of the Maxillofacial and Neck Regions. In Topazian RG et al. Editors. *Oral and Maxillofacial Infection*. 4th Ed. Philadelphia: WB Saunders Company; 2002. p. 303-305.
4. Krespi RP, Lawson W, Blaugrund SM, et al. Massive necrotizing infection of the neck, head neck surgery. In Topazian RG et al. Editors. *Infections of soft tissues of the maxillofacial and neck regions*. *Oral and Maxillofacial Infection*. 4th Ed. Philadelphia: WB Saunders Company; 2002. p. 303-305.
5. Rapoport Y, Himelfarb MZ, Zikk D, et al. Cervical necrotizing fasciitis of Odontogenic origin, *Oral Surgery*. In Topazian RG et al. Editors. *Infections of soft tissues of the Maxillofacial and Neck Regions*. *Oral and Maxillofacial Infection*. 4th Ed. Philadelphia: WB Saunders Company; 2002. p. 303-305.
6. Roser SM. Necrotizing fasciitis, *J Oral Surgery*. In Topazian RG et al. Editors. *Infections of soft tissues of the Maxillofacial and Neck regions*. *Oral and Maxillofacial Infection*. 4th Ed. Philadelphia: WB Saunders Company; 2002. p. 303-305.
7. Chidzonga MM. Necrotizing fasciitis of the cervical region an AIDS patient, *J Oral Maxillofacial Surgery*. In Topazian RG et al. Editors. *Infections of soft tissues of the Maxillofacial and Neck regions*. *Oral and Maxillofacial Infection*. 4th Ed. Philadelphia: WB Saunders Company; 2002. p. 303-305.
8. Andreasen TJ, Green SD, Childers BJ. Massive infectious soft tissue injury, diagnosis and management of necrotizing fasciitis and PurpuraFulminans, *PlastReconstr Surgery*. In Topazian RG et al. Editors. *Infections of soft tissues of the Maxillofacial and Neck regions*. *Oral and Maxillofacial Infection*. 4th Ed. Philadelphia: WB Saunders Company; 2002. p. 303-305.
9. Stamenkovic I. Early recognition of potentially fatal necrotizing fasciitis, *N Engl J Med* In Topazian RG et al. Editors. *Infections of soft tissues of the Maxillofacial and Neck regions*. *Oral and Maxillofacial Infection*. 4th Edition. Philadelphia: WB Saunders Company; 2002. p. 303-305.
10. Tovi F. Necrotizing soft tissue infection in the head and neck, *Laryngoscope*. In Topazian RG et al. Editors. *Infections of soft tissues of the Maxillofacial and neck regions*. *Oral and Maxillofacial infection*. 4th Ed. Philadelphia: WB Saunders Company; 2002. p. 303-305.



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Management of releasable full denture in patient with pseudo jaw relation class III: a case report



Elvi, Edy Machmud,* Bahrudin Thalib, Armawati Arafi, Indah Sulistiawaty

Abstract

Objective: To give information about management of releasable full denture in patient with pseudo jaw relation class III

Methods: A 58 years old woman came with complaints that she could not chew food and felt shy when she laughed, the woman asked a denture made for her. Last tooth withdrawal was 3 months ago. Shape of upper jaw sharp edge is triangle (pointed alveolar ridge), while lower jaw sharp edge is in resorption condition. Making of denture was

started with initial molding, physiology molding, bite determination and teeth arrangement based on Lingualized occlusion to insertion.

Results: A case with pseudo jaw relation class III successfully treated using denture with lingualized occlusion.

Conclusion: Teeth arrangement using occlusion pattern Lingualized occlusion can give natural appearance to patient and stability of denture.

Keyword: Full denture, Pseudo jaw relation class III, Lingualized occlusion.

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Introduction

For edentulous patient who had lost all or half of teeth is suggested to apply denture. Posterior teeth loss can affect the stability vanishing of neuromuscular mandibular, decrease chewing efficiency and aesthetics. Therefore, wearing denture can restore the function of teeth even mastication function, phonetics and aesthetics function. To gain those functions, all steps of denture have to be watched carefully. If one of the steps is not performed appropriately, comfort and function of denture will decrease.¹

In case of teeth loss that is not replaced with denture, alveolar bone resorption can occur from time to time. Speed level of alveolar sharp edge resorption is different between upper and lower jaw and resorption speed of lower jaw is greater than upper jaw. Resorption of alveolar sharp edge in part of upper jaw anterior is disposed to anterior direction and interior direction with level of progressive bone vanishing. Resorption of upper jaw posterior is disposed to anterior and interior direction so that alveolar sharp edge wanes progressively. Jaw relation that seems is pseudo jaw relation class III.²

To gain stability, aesthetics and good function of that jaw condition one treatment that can be performed is by making posterior teeth arrangement, lingualized occlusion. Lingualized occlusion is occlusion pattern with cusp palatal posterior of upper jaw teeth contact to fossa centralis posterior of lower jaw. So that all of the forces that emerge during working and balancing movements decrease and create stability naturally.^{3,4}

Then in this case report, to get appearance alike original teeth and upper jaw stability which is in resorption condition greater than lower jaw the arrangement of posterior teeth with lingualized occlusion was performed.

Case Report

A 58 years old woman came to Prosthodontics Clinic, Dental Hospital Hasanuddin University, Makassar, Indonesia and she wanted a denture made because she felt shy as she laughed and she could not chew properly. Last tooth withdrawal for tooth 26 was done 3 months ago.

Figure 1 based on examination result, it seemed that shape of upper jaw sharp edge was triangle (pointed alveolar lingir) while lower jaw sharp edge was in resorption condition. From radiography examination, there was bone loss that spread evenly in lower jaw which caused sharp edge flat.

Initial treatment was performed by anatomical molding in patient using irreversible hydrocolloid. Based on anamnesis result and patient model study, patient was advised to make full denture in upper jaw and lower jaw from acrylic. After making of individual molding spoon from acrylic autopolymerisation, patient was performed border molding and physiological molding in the next visitation by retromylohioid molding technique in lower jaw with elastomer molding material **figure 2**.

Figure 3 in the next visitation, parallel determi-

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Figure 1 Front and side appearance of patient



Figure 2 Appearance of patient intra oral



Figure 3 Physiological shaping

nation of bite rim of upper jaw, vertical dimension determination, note making of upper jaw relation and lower jaw in the center relation position and then putting bite rim of upper jaw and lower jaw in articulation were carried out.

The conducted anterior teeth formation and tried in to the anterior teeth of the patient. Next step was conducting posterior teeth formation with lingualized occlusion. Lingualized occlusion is made by putting cusp of posterior teeth palatal of upper jaw in fosa centralis of posterior teeth of lower jaw **figure 4**.



Figure 4 Teeth formation



Figure 5 Try in Denture in patient's mouth



Figure 6 Insertion of denture



Figure 7 Occlusion point in lingualized occlusion

After teeth formation in articulation then non original tooth tried on to the patient **figure 5** and if it is fit then creamed to be packed.

After lab process, denture was inserted to the patient **figure 6**. Patient was also instructed about the way to put and to take out the denture, the way to clean the tooth and control 1 × 24 hours, then 2 weeks, 1 month and finally after 3 months.

Discussion

Jaw relation is defined as the relation between upper and lower jaw. In this case the relation between patients jaw was abnormal relationship. It was because the upper jaw experienced bigger reabsorption of tooth loss and irreplaceable with denture compared to the lower jaw. This appeared to become jaw relation of pseudo class III. Then to gain

natural look and stability, posterior teeth formation with lingualized occlusion was conducted.^{6,7}

Teeth formation in lingualized occlusion is that cusp palatal of upper jaw posterior in fossa centralis of lower jaw. The concept of lingualized occlusion is applying anatomic denture in artificial teeth with non anatomic denture in the lower jaw. This concept was introduced by Alfred Gyte, SH Payne called cusp to-fossa occlusion or lingualized occlusion.^{6,7}

In some in vivo and in vitro studies said that lingualized occlusion in patient [figure 7](#) with full denture has stable, retention, aesthetic and comfort optimum chew experience. It is also stated that lingualized occlusion can be very effective in the application of full denture opposite with partial denture. By only cusp palatal of the upper jaw contacted with fossa centralis of lower jaw, there is only one or two contact conducts. Cusp palatal contacted when centric, balance, working, furthermore for this reason, all pressures appear during working movement and balancing reduce naturally created stability.⁶⁻⁸

Conclusion

The relationship of pseudo class III occurred in some patients with partial tooth loss because of resorption process in none tooth area faster than that in the tooth are. It occurs because the upper jaw which loss most of the teeth have resorption of normal bone,

those move forward, backward or up with progressive response meanwhile it recognized smaller than those in the lower jaw. In conclusion, one of the treatment conducted is to perform teeth foundation in occlusion pattern of lingualized occlusion which gives natural appearance in patient and stability of denture.

References

1. Jørgensen EB. Restoration of the partially edentulous mouth: a comparison of overdentures, removable partial dentures, fixed partial dentures and implant treatment. *J Dent* 1996;24: 237-244.
2. Winkler S. Clinical implant site development and Alveolar bone resorption. Philadelphia.
3. Prasad DKB, Prasad R, Bardia A, et al. Enhancing stability. A review of various occlusal schemes in complete denture prosthesis. *NUJHS* 2013;3: 105-112.
4. Ahmed AR, Muneer MU, Hakeem S. Masticatory efficiency between balanced and lingualized occlusion in complete denture wearers. *PODJ* 2013;33: 200-206.
5. Petruska L. Utilizing lingualized posterior occlusion in the construction of complete denture. *J Dent Tech* 2011: 11-14.
6. Hornischer TG. The importance of lingualized occlusion. *J Dent Tech* 2009: 20-24.
7. Kimoto S, Yamakawa A, Ajiro H, et al. Prospective clinical trial comparing lingualized occlusion to bilateral balanced occlusion in complete dentures. A pilot study. *J Int Pros* 2006;19: 103-109.
8. Becker CM, Swoope CC, Guckes AD. Lingualized occlusion for removable prosthodontics. *J Prosthet Dent* 1977;38: 601-608.



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