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The Effectiveness Of Chewing Apples On The Plaque Index In Primary School Children (Literature Study)

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Abstract

Chewing apples is an alternative for reducing the plaque index on teeth, because apples contain vitamins and tannins which function to clean teeth and freshen the mouth to avoid gum disease caused by plaque on teeth. The aim of this study was to determine the effectiveness of chewing apples on reducing the plaque index on the teeth of elementary school children. The type of research used is literature study. The literature study method is a series of activities related to methods of collecting library data, reading and taking notes, and managing research materials. The results of previous studies that have been reviewed from several journals or other references show the effectiveness before and after chewing apples on the plaque index on teeth. The release of saliva and assisted by the water content in apples is able to clean food residue stuck to the surface of the teeth. The conclusion is that chewing any type of apple can provide better effectiveness in reducing the plaque index on teeth. Chewing apples can be used as a natural ingredient to reduce the plaque index on teeth.

Keywords: Effectiveness, Chewing, Application, Plaque Index, Primary School, Children

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1. Introduction

Health development aims to improve health and the ability to live healthily for everyone in order to create an optimal level of public health, so as to create an Indonesian society, nation and state that lives with healthy behavior and environment, and has the

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ability to reach quality health services in a fair manner. Dental health is an integral part of national health development, meaning that health development is carried out by giving priority to efforts to improve health, prevent disease without neglecting efforts to heal and restore health, including at primary school age achieving an optimal level of health. (Ministry of Health of the Republic of Indonesia, 2000 in Sumini et al, 2014).

Dental and oral diseases that many Indonesian people suffer from are gingivitis and dental caries, the source of these two diseases is the result of neglect of dental and oral health, resulting in plaque accumulation (Putrid, 2012). Teeth with cavities are certainly unhealthy, Indonesian people still do not consider dental and oral health. This can be seen from the fact that 50% of Indonesians aged over 10 years have dental caries problems that have not been resolved. Other facts show that someone who suffers from dental and oral disease is cumulatively aggressive, meaning that the damaged area cannot be healed (Mangku, 2009 in Hidayati et al., 2016).

Based on the 2018 Basic Health Research (Riskesdes) from the Indonesian Health Department, 93% of children under the age of 12 experience dental caries. In addition, 43.4% of Indonesian people aged 12 years and over have active caries (caries that has not been treated) and 67.2% had caries experience.

The problem of high levels of dental and oral disease is caused by many factors, including children's behavioral factors, including the habit of brushing their teeth, the habit of consuming cariogenic foods, the habit of drinking from bottles, the lack of parental awareness of seeing a doctor and the lack of parental knowledge about the importance of caring for children's teeth from an early age. starts during pregnancy. (Damayanti, 2008 in Nurhayati 2010).

Dental plaque plays an important role in causing dental and oral health problems. The level of dental and oral hygiene can be seen from the plaque formation process. Plaque is the main etiological factor in the occurrence of caries and periodontal disease because it contains pathogenic bacteria that adhere to the surface of the teeth and gingiva (Edwina et al., 1992 in C. penda, 2015).

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Natural plaque control is by chewing fibrous foods. The habit of eating fibrous foods acts as a natural plaque control. Physiologically solid and fibrous foods will increase the intensity of chewing in the mouth. The process of chewing this food will stimulate and increase saliva production. Saliva will help rinse the teeth from food particles attached to the teeth and also dissolve the sugar components from food residue trapped in between the pits and fissures of the tooth surface. Some fresh, semi- ripe, juicy and fibrous fruit can help reduce plaque index, one of which is apples. Chewing apples can have a positive effect on dental health. Chewing apples is often called a natural way of brushing teeth, because apples have large particles that must be chewed again before swallowing and also apples are a fruit that contains fiber so it encourages saliva secretion (Ismu SS in C. Penda, 2015).

Plaque is a layer formed from food residue that sticks to teeth which reacts with saliva, bacteria, enzymes and acids. Stickiness contains bacteria that form on the surface of the teeth and plaque occurs when eating foods that contain carbohydrates, soft drinks, cakes or candy and remaining on the teeth. Poor dental cleaning causes plaque to stick even more (Sariningsih E , 2014 in Koagouw, 2016).

Maintaining dental and oral health aims to remove plaque regularly, preventing plaque from accumulating and over time causing damage to dental and periodontal tissue. Plaque cannot be removed simply by gargling with water (Hasmar, 2006 in Rahmawati, 2011).

According to Ilyas (2000 in Rahmawati, 2011) who explains that elementary school (SD) is a very strategic group for dealing with dental and oral health. Primary school age children are a time when children do not know properly how to care for and look after their teeth. well. At this time children act as a place to lay a solid foundation for the realization of quality human beings and health is an important factor that determines this quality. Elementary school children, especially at the age of 10 years, are the age where teeth begin to change. At the age of 10-13 years there is a change from milk molars or milk molars to premolars or small molars. Most children don't keep their teeth and mouth clean, and they are too lazy to get into the habit of brushing their teeth at least

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twice a day. This is based on a lack of knowledge of the benefits of brushing teeth properly and correctly. Children are still at the stage where they need guidance from their parents. Apart from teaching children to brush their teeth at least four times a day, children can be invited to eat fruits which have the power to clean their teeth or are often referred to as self-cleansing effects, one of which is apples. Apples are one of the fibrous fruits that can be obtained on the market. Fresh apples contain lots of vitamins, minerals, coarse fibers, water content, and tannins (Soelarso, 1997 in Nurhayati 2010).

The fiber and water content of apples can stimulate the speed of saliva secretion and can neutralize acidic substances. Apples also contain tannin which acts as an astringent, spasmolytic and antiseptic. Tannin also helps inhibit the growth of plaque that causes caries and gum disease. Eating apples has the effect of cleaning the teeth and mouth after eating which can inhibit the formation of dental plaque, so this fruit is often called a fruit that has the power to clean teeth or self-cleansing (stabilis, 2004 in Hidayanti et al, 2016).

Robbins (1945 in Amelia's quote, 2015) defines effectiveness as the level of short-term and long-term organizational achievement. Effectiveness means success or usefulness. Effective is a basic word, while the adjective effective is effectiveness. According to Effendy, effectiveness is as follows: "Communication in which the process achieves the planned goals in accordance with the budgeted costs, the specified time and the specified number of personnel."

According to Sejathi (2011 in a quote from Amelia, 2015), effectiveness is a useful result, supporting goals. Soewarno Handayaningrat (1983) in Amelia states that effectiveness is a measurement in the sense of the detailed targets or objectives that have been determined previously. Effectiveness is also related to the problem of how to achieve the goals or results obtained, the usefulness or benefits of the results obtained, the level of power of the elements or components, as well as the problem of the level of user satisfaction.

Mastication is a functional unit consisting of the dentition temporomandibular joint (TMJ), which aims to crush. muscles that support mastication either directly or

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indirectly as well as blood vessels and nerves that support the entire supporting tissue system. The main masticatory muscles are the masseter muscle, temporalis muscle, lateral pterygoid muscle and medial pterygoid muscle. The role of these muscles in the movement of opening and closing the mouth is very important to coordinate the movement of the mandible so that the teeth can function optimally (Bradley, 1995 in Suhartini, 2011).

1. Apple

   Apples are a fruit that is easy to get because they are sold in various places where fruit is sold, from shops to traditional markets, as well as on the side of the road. Various types and colors of apples are everywhere and easy to find. Apples are widely liked because they taste distinctive and sweet. Behind its tempting shape, it turns out that apples have many benefits (Suwarto, 2010 in Arifah, 2019).

2. Types of Apples

   a) Manalagi Apples

      Manalagi apples are dense fruit and contain high fiber so they can be used as a natural way to control plaque. One of the ingredients in Manalagi apples is tannin, tannin has bactericidal abilities. Tannin functions to clean and freshen the mouth. (Nurhayati S et al, 2010 in Roza, 2020).

   b) Anna type apple

      Anna apples are a fruit that can clean teeth because they have the ability to self-clean. Anna apples can be consumed to get a supply of fiber for the body. Most of the fiber, apart from being found in the fruit, is also found in the skin. (Huda et al , 2015 in Pratiwi, 2020)

3. Apple Content

   1) Tannin

      This tannin is a substance that functions to clean and freshen the mouth, so it can prevent tooth decay and gum disease caused by plaque buildup (Astawan, 2008 in Nurasiki, 2017).

   2) Maleic acid

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Maleic acid functions to clean dull tooth color (Alhamda, 2011 in Nurasiki 2017).

3) Contains Fiber

Fiber functions to bind fat and bad cholesterol in the body and is very suitable for those on a diet (Ucihadiyanto, 2021).

4. Benefits of Apples

According to Ucihadiyanto (2021) there are several benefits of apples for body health:

1) Reducing weight (diet)

Apples are a fruit that can help you lose weight, this is because apples have high water and fiber content and can make you full. Eating an apple before meal time will maintain your portion size. If you are serious enough about losing weight, try replacing some foods with apples. Eating apples three times a day for 12 weeks can help you lose weight.

2) Cleans and freshens the mouth

Apples can also be used as a medium to clean and freshen the mouth. This is because apples contain tannin. Tannin functions to clean and freshen the mouth, so it can prevent tooth decay and gum disease caused by plaque buildup.

Plaque is a layer formed from food residue that sticks to the teeth which reacts with saliva, bacteria, enzymes and acids. Stickiness contains bacteria that form on the surface of the teeth and plaque occurs when eating foods containing carbohydrates, soft drinks, cakes or candy and remains on the teeth. Poor teeth cleaning causes plaque to stick more and more (Sariningsih E. 2014 in S. Koagouw, 2016).

According to Carlson in Apriliyandy (2014), the factors that influence the occurrence of dental plaque are divided into 2, namely:

1. Physical environment
   a. Tooth anatomy and tooth position
   b. Anatomy of the tissue around the teeth
   c. Tooth surface structure
   d. Friction by food and surrounding tissue
2. Oral hygiene measures

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a. The presence of nutrients includes:
    1. Food or diet
    2. Gum fluid
    3. Remaining epithelium and leukocytes
    4. Saliva

3. Dental Plaque Formation

Plaque formation occurs through internal division and surface deposition. Various varieties of bacteria will attach to this column and multiply so that within 3-4 weeks a microbial flora will form which reflects the balance of the ecosystem of organisms or microbes on the tooth surface (Caranza et al, in Aprillyandy, 2014).

Dental plaque can be visible 1-2 days without oral hygiene measures. Plaque can be white, grayish or yellow and has a round appearance. Small amounts of plaque that cannot be seen on the tooth surface can be detected with a periodontal probe along the upper third. Another method used is by using a disclosing solution. Without oral hygiene measures, plaque can persist and continue to accumulate until a balance is achieved between plaque removal. The process of plaque formation occurs in 3 phases, namely formation (Caranza, 2002 in Apriliyandy, 2014):

a. Pellicle

Pellicle formation is the initial phase of plaque formation. Several seconds after brushing teeth, a thin layer of salivary protein deposits which mainly consist of glycoproteins will form on the surface of the teeth (as well as on restorations and dentures). This layer, called the pellicle, is thin, smooth and colorless. This layer is tightly attached to the tooth surface (Manson, 1993 in Apriliyandy, 2014).

b. Initial Colonization of Tooth Surfaces

Within a few minutes after being deposited, these polycles will be populated with bacteria. Bacteria can be deposited directly on email. But usually the bacteria attach first to the pellicle and the bacteria can penetrate the salivary glycoproteins (Manson, 1993 in Apriliyandy, 2014).

c. Second colonization and maturation of dental plaque

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The second colony is a microorganism that did not initially colonize the surface of the tooth in question.

4. Types of Dental Plaque

In its development, dental plaque is classified based on its location on the gingival edge, namely: supragingival plaque and supgingival plaque located below the gingival edge, between the teeth and the gingival sulcus wall. Suptagingival plaque is related to microbial contact on the tooth surface. These microbes on the surface of the teeth can travel to the gum sulcus so that they can have more contact with the gingival edge. Subgingival plaque is related to the accumulation of microbes in the gingival sulcus and in the periodontal area (Hamsar, 2010 in Apriliyandy, 2014).

a. Supragingival Plaque

Supragingival plaque is found on the gingival edge or above the gingival edge. Supragingival plaque is a community of microorganisms that accumulates on the upper surface of the teeth to the gingival edge area. Clinically, supragingival plaque can appear as a thin, almost invisible film on the tooth surface or as a thick layer of material covering the tooth surface and gingival margin.

b. Subgingival Plaque

Subgingival plaque is found beneath the gingival margin between the teeth and the gingival pocket epithelium. Subgingival plaque can be defined as a community of microorganisms that accumulates on the apical surface of teeth and the gingival margin. Clinically, the plaque is not easily visible because it is covered by gingival defects or periodontal pockets. Subgingival plaque is associated with the accumulation of microbes in the gum sulcus and in the periodontal pocket. The structure of subgingival plaque has several similarities with supragingival plaque. The characteristic of subgingival plaque is the presence of a number of leukocytes between the surface of the microbial collection and the gum sulcus epithelium.

5. How to Determine the Plaque Index

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Plaque index is a number method that shows the presence of plaque that can be obtained when an examination is carried out. The way to determine the dental and oral hygiene index (plaque) is to provide a disclosing solution.

The plaque index was proposed by Leo and Slines in 1964. This index is indicated for measuring dental plaque scores based on the location and quantity near the gingival margin. This index can be obtained using a dye solution that is applied to the entire surface of the tooth and then checked. . Each tooth is examined on four surfaces, namely the mesial, distal, lingual and palatinal surfaces, then the score is calculated. (Debanath, 2002 in quotations from Apriliyandy, 2014).

Score.	Category
0	No There is plaque
1	Spots plaque Which separated separate on cervical margins and teeth
2	Layer thin >1mm And plaque around cervix
3	Layer plaque > cover between 1/3 surface tooth
4	Layer plaque cover between 1/3-2/3 surface tooth
5	Layer plaque cover >2/3 surface tooth

Total plaque score = (sum of buccal and lingual scores on the upper jaw) + (sum of buccal and lingual scores on the lower jaw).

$$\text{Dental plaque score} = \frac{\text{Total plaque score}}{\text{Number of teeth examined}}$$

The resulting value is in the form of a number/score. The criteria for assessing the level of oral hygiene are based on the PHP (personal hygiene performance) plaque index, namely (Pintauli, 2000 in Apriliyandy, 2014).

a.	Very Good	0
b.	Good	0.1 - 1.7

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c.	Currently	1.8 - 3,4
d.	Bad	3.5

2. Research methods

The type of research used is literature study. The literature study method is a series of activities relating to methods of collecting library data, reading and taking notes, and managing research materials (Zed, 2008:3).

The data used comes from textbooks, journals, scientific articles, literature reviews which contain an overview of knowledge of how to brush teeth against the occurrence of plaque in elementary school children. Data analysis begins with research result material which is sequentially considered from the most relevant, relevant and quite relevant. Note important and relevant parts of the research problem, to avoid being caught in the element of plagiarism, researchers should also note sources of information and include a bibliography. If the information comes from other people's ideas or research results. Make notes, quotes or information that is arranged systematically so that research can easily be retrieved if it is needed at any time (Darmadi, 2011).

3. Results and Discussion

Apples are a fibrous food that is known to clean food residue stuck to the teeth. Apples contain high concentrations of tannin which can prevent tooth decay and gingival disease caused by plaque buildup. The crunch and fiber content in apples can help clean food debris stuck to the teeth, because apples are a fibrous fruit so chewing apples can be called a natural toothbrush. Chewing an apple requires quite strong biting pressure so that the intensity of chewing increases and triggers the release of saliva. The release of saliva and assisted by the water content in apples is able to clean food residue stuck to the surface of the teeth.

(Dalimartha 2011 in Nurasiki, 2017) said that it is important to consume apples which contain tannin which is directly beneficial for dental and oral health, so it will have a significant impact on individual health. Apart from that, the habit of eating foods that

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contain fiber does not stimulate plaque formation, and can act as a natural plaque controller.

This was also explained in research conducted by Oktavina (2015) regarding primary prevention in children at high risk of caries, that eating more fibrous and juicy fruits will cleanse and stimulate saliva secretion so that dental caries can be prevented.

Based on the research results of Nurasiki (2017), it was found that the average difference in plaque index between before chewing an apple was 0.85 with a deviation of 0.553. The average difference value was in the range of lower (0.73) and upper (0.97) plaque index so that Ho was rejected and Ha was accepted (p-value <0.000). This means that there is a difference in the plaque index between before chewing an apple among students at SDN 1 Tanjong, Lhoknga District, Aceh Besar. In other words , chewing 100 g of apple can reduce the dental plaque index in elementary school students. In conclusion, one easy way to prevent plaque is to regulate your eating habits by increasing the consumption of fibrous foods such as fruit, namely apples, because they have cleaning power.

Based on the results of Penda's research (2015), the plaque index before chewing was 2.111 and the average plaque index score after chewing an apple was 1.152. These results using the paired t-test can be stated that there is a significant difference in results between the plaque index before and after chewing the apple. This is because the researcher gave the respondent an apple to chew. In conclusion, apples can have an effect on the plaque index on teeth because the fiber content in apples helps clean plaque that sticks to teeth.

Based on the research results of Roza (2020), it is known that the average plaque index of students aged 9-12 years at SD Muhammadiyah 11 Mangkuyudan Surakarta before chewing an apple was 30.33 with a standard deviation of 0.244, while after chewing an apple the minimum was 12.88 with a standard deviation of 0.579, so the results of this study can be said that there is a difference in the plaque index before and after chewing an apple. In conclusion, apples, which are small in size, can prevent plaque

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formation both mechanically and chemically, namely as self-cleansing through their fibers which can clean remaining dental plaque by biting and chewing.

Based on the research results of Nawang (2020), data obtained through observation by measuring the plaque index in 2 groups of class IV-A students at SDN Tambakwedi 508, it is known that the plaque index value before chewing Anna apples was 2.2, whereas after chewing Anna apples there was a decrease. plaque index of 0.8. This means that there was a decrease in the plaque index in fourth grade students at SDN Tambakwedi 508 before and after chewing peeled Anna apples. In conclusion, chewing Anna apples can clean food remains on the teeth, because apples contain tannin so they can prevent plaque from forming on them. tooth.

Based on the research results of Nurhayati (2011), it is known that the plaque index value before chewing an apple is at least 1.16, namely 1 respondent (3.3%). Meanwhile, the highest plaque value was 2.83, with 2 respondents (6.7%) with the average plaque index value before chewing an apple, namely 2.122. Meanwhile, the plaque index value after chewing an apple was at least 0.20, namely 2 respondents (6.7%) and the highest plaque index value was 1.16, namely 1 respondent (3.3%) with the average plaque index value after chewing the fruit. apple of 0.697. This shows that there is an increase in the plaque index value of respondents after chewing an apple, which shows that the respondent's dental hygiene has improved. The factor that causes increased dental hygiene after chewing apples is that the fruit consumed contains fiber which can control plaque formation mechanically because the chewing process directly creates a cleaning effect.

Based on several theories from several supporting studies, this proves that previous research from Puput Utari in 2020 was correct that the fiber and water content in apples can stimulate the speed of saliva secretion and neutralize acidic substances. Apples also contain tannin which is antiseptic. Tannin works to clean teeth, inhibiting the growth of bacteria on teeth thereby preventing the growth of plaque that causes dental caries and gum disease. This causes plaque bacteria to be unable to stick and easily come off the surface that has been treated with chewing apples.

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4. Conclusion

Based on the results of several journals and reviews, it can be concluded that chewing any type of apple can provide better effectiveness in reducing the plaque index on teeth. Chewing apples can be used as a natural ingredient to reduce the plaque index on teeth, because they contain vitamins and tannins which function to clean and freshen the mouth so as to prevent tooth decay and gum disease caused by plaque.

5. Compliance with ethical standards

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Disclosure of conflict of interest

This research collaboration is a positive thing for all researchers so that conflicts, problems and others are absolutely no problem for all writers.

Statement of informed consent

Every action we take as authors is a mutual agreement or consent.

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