



# Community Medicine & Education Journal

Journal Homepage:

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## The Role of Dragon Fruit Consumption (*Hylocereus polyrhizus*) against Plaque Reduction in Students at SD Negeri 106806 Cinta Rakyat, Percut Sei Tuan District, Deli Serdang Regency, Indonesia

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### ARTICLE INFO

#### Keywords:

Dragon fruit (*Hylocereus polyrhizus*)  
Plaque  
Student  
Tooth

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All authors have reviewed and approved the final version of the manuscript.

<https://doi.org/10.37275/cmej.v4i3.396>

### ABSTRACT

Dragon fruit contains fiber, which is good for digestion and oral health. Fiber can help clean teeth by binding to plaque and food particles that can cause gum disease. The vitamin C contained in dragon fruit is a powerful antioxidant and can help strengthen gum tissue. This can help prevent gum inflammation (gingivitis), which is the initial stage of gum disease. Because dragon fruit has a high water content, consuming this fruit can also help maintain oral moisture, which is important for healthy teeth. A dry mouth can increase the risk of plaque formation. This study aimed to determine the potential for consuming dragon fruit (*Hylocereus polyrhizus*) against plaque reduction in students at SD Negeri 106806 Cinta Rakyat, Percut Sei Tuan District, Deli Serdang Regency, Indonesia. This study is experimental research with a one-group pre and post-test approach. This study uses primary data obtained from measuring the degree of plaque on the teeth of research subjects. A total of 30 research subjects participated in this study, where the research subjects met the inclusion criteria. The results showed that the dental plaque scores of students at SD Negeri 106806, Cinta Rakyat, Percut Sei Tuan District, Deli Serdang Regency, decreased significantly before and after eating dragon fruit (*Hylocereus polyrhizus*), with a value of  $p=0.0001$  ( $p<0.05$ ). These results indicate that there is an influence of dragon fruit consumption (*Hylocereus polyrhizus*) on reducing dental plaque in research subjects.

### 1. Introduction

Dental plaque is the main cause of dental caries in children. Bacteria in plaque convert sugar in food into acid, which can then damage tooth enamel. If left untreated, caries can develop into a deeper and more painful infection. Plaque that forms around the gum line can cause gum inflammation, known as gingivitis. Inflamed gums will usually become red, swollen, and bleed when brushing your teeth. Gingivitis in children can be painful and interfere with eating. If gingivitis is not treated, the condition can progress to a more serious gum disease called periodontitis. This can damage the supporting tissues of the teeth, including

the jawbone, and even result in tooth loss. Periodontitis in children is quite rare, but it can occur. If plaque is allowed to form on a child's baby teeth, it can cause permanent damage to the older teeth later. Damaged milk teeth can interfere with the development of permanent teeth that come behind them. Untreated caries can develop into serious infections and abscesses. This can cause intense pain, swelling, and even general health problems if bacteria from the infection get into the bloodstream. Bad habits in maintaining dental health during childhood can continue into adulthood. Children who experience serious dental problems in childhood are more likely

to face persistent dental health problems as adults. Children who have dental health problems often face psychological and social problems, such as feeling embarrassed because of damaged or diseased teeth. This can affect their self-confidence and quality of life.<sup>1-5</sup>

Dragon fruit, especially the *Hylocereus polyrhizus* variety, is a good source of nutrition. This fruit contains various vitamins, minerals, fiber, and antioxidants, such as vitamin C, vitamin B, carotenoids, and flavonoids. These nutrients can play a role in maintaining oral and dental health. The antioxidants in dragon fruit can help protect mouth and gum cells from damage caused by free radicals. This may reduce the risk of gum inflammation and prevent plaque buildup. Dragon fruit contains fiber, which is good for digestion and oral health. Fiber can help clean teeth by binding to plaque and food particles that can cause gum disease. The vitamin C contained in dragon fruit is a powerful antioxidant and can help strengthen gum tissue. This can help prevent gum inflammation (gingivitis), which is the initial stage of gum disease. Because dragon fruit has a high water content, consuming this fruit can also help maintain oral moisture, which is important for healthy teeth. A dry mouth can increase the risk of plaque formation.<sup>6-</sup>

<sup>10</sup> This study aimed to determine the potential for consuming dragon fruit (*Hylocereus polyrhizus*) against plaque reduction in Students at SD Negeri 106806 Cinta Rakyat, Percut Sei Tuan District, Deli Serdang Regency, Indonesia.

## 2. Methods

This study is experimental research with a one-group pre and post-test approach and uses primary data obtained from measuring the degree of plaque on the teeth of research subjects. A total of 30 research subjects participated in this study, where the research subjects met the inclusion criteria. The inclusion criteria were students at SD Negeri 106806 Cinta Rakyat, Percut Sei Tuan District, Deli Serdang Regency, Indonesia, aged 9-12 years, and had received approval from their parents/guardians to participate

in this study. This study has received approval from the medical and health research ethics committee of the Faculty of Medicine, Dentistry and Health Sciences, Universitas Prima Indonesia, Medan, Indonesia.

Measurement of the degree of plaque on teeth was carried out pre and post-treatment. The Silness and Loe index is one of the indices used to assess the level of dental plaque in patients. This index is a tool used by dental professionals to measure the extent to which a patient's teeth are affected by the accumulation of dental plaque, which is a sticky layer consisting of bacteria, food debris, and bacterial excretion products. Score 0: No visible plaque on the teeth. Score 1: Plaque can only be seen by using plaque dye or by feeling the surface of the tooth with a special tool. Score 2: Plaque is visible to the naked eye, but only in small amounts or in certain areas. Score 3: Plaque is visible on most of the tooth surface. Score 4: Plaque covers almost the entire surface of the teeth, but there are still certain areas that are not affected by plaque. Score 5: Thick plaque covers the entire tooth surface. The intervention in this study was giving research subjects 200 grams of dragon fruit a day for seven days. Dragon fruit is consumed twice a day: in the morning before brushing your teeth and in the afternoon before coming home from school. Data analysis was carried out using SPSS version 25 software. Univariate and bivariate analyses were carried out in this study. Univariate analysis was carried out to present the frequency distribution of each test variable. Bivariate analysis was carried out to determine the relationship between test variables where the p-value <0.05.

## 3. Results and Discussion

The results showed that the majority of subjects were 10 years old, namely 18 people (60%), followed by 11-year-old subjects, namely 10 people (33.3%), and only 1 person aged 9 and 12 years, respectively (3.3%). In the table above, there are more female subjects than male subjects. 17 subjects were female (56.7%), while 13 subjects were male (43.3%).

Table 1. Subject characteristics.

Characteristics	Frequency	Percentage (%)
Age (years)		
9	1	3,3
10	18	60,0
11	10	33,3
12	1	3,3
Gender		
Male	13	43,3
Female	17	56,7

Table 2. The effect of consumption of dragon fruit (*Hylocereus polyrhizus*) against dental plaque reduction.

Observation	n	$\bar{x} \pm SD$	Mean difference	p-value
Before	30	2,20±0,33	1,16±0,30	0,0001*
After	30	1,04±0,29		

\*Paired t-test,  $p < 0,05$ .

The results showed that the dental plaque scores of students at SD Negeri 106806, Cinta Rakyat, Percut Sei Tuan District, Deli Serdang Regency, decreased significantly before and after eating dragon fruit (*Hylocereus polyrhizus*), with a value of  $p=0.0001$  ( $p \leq 0.05$ ). These results indicate that there is an influence of dragon fruit consumption (*Hylocereus polyrhizus*) on reducing dental plaque in research subjects.

The reduction in dental plaque in this study could be caused by the process of chewing food that is rich in fiber, which can produce effects that occur mechanically, physiologically, and chemically in the process of cleaning food and reducing the accumulation of food in the oral cavity. Natural foods rich in fiber do not contain harmful chemicals. Naturally, chewing food at least 32 times stimulates the production of saliva, which helps clean teeth. Chewing fibrous foods has a mechanical effect similar to that of a toothbrush and can help reduce plaque from the surface of the teeth before it hardens into plaque. Therefore, chewing fresh, fibrous fruit can be one way to control plaque on teeth. Cleaning naturally can make it easier to remove particles in food and sugar when chewing. In addition, foods with fiber need to be chewed longer. Mouth movements in chewing can stimulate taste receptors through the trigeminal nerve and facial nerve. This results in stimulation of the parasympathetic nervous system, which in turn

causes dilation of blood vessels in the salivary glands. As a result, saliva flow increases because saliva secretion is very dependent on nutrients carried by blood vessels running towards the salivary glands. Nearly 90% of total saliva production occurs when eating as a response to stimulation from the process of tasting and chewing food.<sup>11-15</sup>

The reduction of dental plaque is also influenced by the active substances found in dragon fruit. dragon fruit (*Hylocereus polyrhizus*) contains a variety of active substances, including flavonoids, acetic acid, vitamin B1 (tiamin), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B6 (pyridoxine), vitamin C (ascorbic acid), protein, fat, carbohydrates, fiber, polyphenols, phosphorus, iron and phytoalbumin chemically. Flavonoid compounds have various beneficial effects, such as having antioxidant properties that can provide resistance to free radicals, anti-inflammatory properties to reduce inflammation and being able to act as antivirals and antibacterials to fight viral and bacterial infections. Flavonoids can have a damaging effect on bacterial cell walls through interactions with alcohol groups in compounds that have different polarity from the lipids that make up bacterial DNA. This allows flavonoids to penetrate into the bacterial cell nucleus and cause damage to the bacteria.<sup>16-20</sup>

#### 4. Conclusion

There is an effect of the consumption of dragon fruit on reducing the degree of plaque on the teeth of students at SD Negeri 106806, Cinta Rakyat, Percut Sei Tuan District, Deli Serdang Regency, Indonesia.

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