

DIFFERENCES IN DENTAL ADHESION ACCORDING TO VISCOSITY AND SUGAR CONTENT OF FOODS CAUSING DENTAL CARIESMi-Suk Cho^{1*} and Young-Hee Jeong²¹Dept. of Dental Hygiene, Choonhae College of Health Sciences, Ulsan, 44965, Korea.²Dept. of Dental Hygiene, DongJu College, Busan, 49318, Korea.

*Corresponding Author: Mi-Suk Cho

Dept. of Dental Hygiene, Choonhae College of Health Sciences, Ulsan, 44965, Korea.

Article Received on 21/11/2023

Article Revised on 11/12/2023

Article Accepted on 01/01/2024

ABSTRACT

This study aims to find out the difference in tooth adhesion according to the viscosity of caries such as chocolate, jelly, candy, and caramel, which teenagers consume a lot, and to prevent caries by reducing the intake of caries with high tooth adhesion. This study selected the four most representative foods among caries, measured the sugar content and viscosity of each foods causing dental caries, and measured the tooth adhesion accordingly.

1. The sugar content of foods causing dental caries differed in all foods, followed by caramel> jelly> candy> chocolate($p<0.05$).

2. The viscosity of foods causing dental caries differed in all foods and showed the highest significance in caramel($p<0.05$).

3. The adhesion of foods causing dental caries differed in all foods, and was measured in the order of candy> caramel> jelly> chocolate($p<0.05$).

In the above study, there was no correlation between the sugar content and viscosity of foods causing dental caries, and the tooth adhesion was high in the order of candy>caramel>jelly>chocolate. Therefore, it is considered desirable to pay attention to the consumption of candy and caramel with high tooth adhesion and pay attention to preventing dental caries.

KEYWORD: Adhesion, Foods causing dental caries, Viscosity.**INTRODUCTION**

Dental caries a chronic disease is epidemiologically the most common general disease among adolescents, and dental caries will increase depending on food quality. Foods such as candies, caramel, and soda, which teenagers eat most as snacks, are high in sugar. Foods with high tooth adhesion are a major cause of dental caries by staying in the mouth for a long time and continuously producing acid. Therefore, the increase of sugar intake including sugar is likely to increase the risk of dental caries increases.

Keyes reported that among the causes of dental caries, saliva components, viscosities, and buffering effects had a great influence on the induction of dental caries.^[1] When sugar is ingested, the pH of the tooth surface decreases to 5.5 or less, and the saliva secretion rate decreases due to damage to the tooth surface exposed to acid. In addition, the number of swallowing decreases and self-cleaning does not work well, so the buffering capacity of saliva in the oral cavity also decreases, resulting in a lot of dental caries.

Dental caries are the most common oral disease that has

been frequent since childhood and is likely to experience the majority of local residents in each life cycle and catch them throughout their lives.^[2] Dental caries have been frequent since childhood, and are the most common oral disease that most local residents experience throughout their lives and are prone to developing throughout their lives.

According to the Health Insurance Review and Assessment Service's data, gingivitis, periodontal disease, and dental caries ranked first and fourth among outpatient frequent diseases from 2019 to 2021, respectively.^[3]

According to the Ministry of Health and Welfare's 2022 Child Oral Health Survey, the permanent teeth DMF rate for 12-year-olds was 58.4%, and the permanent DMF index for 12-year-olds was 1.94.^[4]

It is also a chronic disease that is difficult to prevent completely, with a very serious disease that more than half of teenagers experience.^[5,6]

This study aims to find out the difference in tooth adhesion according to the viscosity of caries such as

chocolate, jelly, candy, and caramel, which teenagers consume a lot, and to prevent caries by reducing the intake of caries with high tooth adhesion.

Experimental materials and methods

2-1. A sugar content measurement experiment.

In the sugar content measurement experiment, caries food (chocolate, candy, caramel, jelly), digital scales, lactic acid paper, distilled water, sugar meter, beaker, glass rod, sambal, alcohol lamp, torch, physiological saline, dropper, and tweezers were used.

The sugar meter measures the sugar content after setting the score to 0 using distilled water.

- 1) Use a beaker and an alcohol lamp to double boil the foods causing dental caries.
- 2) Using a digital scale, weight each 0.4g of foods causing dental caries on parchment paper.
- 3) Add distilled water to a beaker of 4 ml each using a dropper.
- 4) The sugar content of foods causing dental caries diluted in distilled water is measured using a sugar meter without lactic acid paper.

2-2. Viscosity Measurement Experiment

In the viscosity measurement experiment, foods causing dental caries(chocolate, candy, caramel, jelly), beaker, glass rod, sambal, alcohol lamp, torch, physiological saline, spoide, tweezers, timers, cow teeth, and petri dish were used.

- 1) Use a beaker and an alcohol lamp to double boil the foods causing dental caries.
- 2) When the double boiling complete, lift it by 20cm using a glass rod.
- 3) After lifting, measure the falling time using a timer.
- 4) After measuring, rank each viscosity.

2-3. The condition of the cow's teeth soaked according to the difference in viscosity of the food

- 1) Soak the cow teeth for 24 hours in a double boiling foods causing dental caries.

- 2) Take out the soaked cow's teeth and observe them.

2-4. Adhesive measurement experiment

In the adhesion measurement experiment, the teeth of cows dipped for 24 hours were used as plaque disclosing solution, cotton swab, toothbrush, gloves, and caries.

- 1) Take out the cow teeth soaked for 24 hours of foods causing dental caries.
- 2) One person wipes each side of the tooth three times with a toothbrush.
- 3) Use a cotton swab to color the colorant on the cow's teeth.
- 4) Wash under running water for 5 seconds.
- 5) Obtain the oral hygiene index by checking the degree of coloring on the cow's teeth.

RESEARCH RESULTS

Using Excel, the values measured in this study were compared by calculating the average value of O'leary index of viscosity and sugar content of foods causing dental caries and the deviation of the standard deviation.

One-way ANOVA was used to analyze the viscosity and sugar content between foods causing dental caries using SPSS, and post-test was performed using LSD and Scheffe for the difference in significance between each group.

3-1. Analysis of sugar content according to foods causing dental caries

The difference in sugar content according to foods causing dental caries was analyzed. The measurements were average values obtained by measuring the sugar content of caries three times.

Caramel 10.63 points, jelly 10.16 points, candy 9.63 points, and chocolate 7.26 points were measured with high sugar content in the order of caramel > jelly > candy > chocolate, and there was a significant difference in all foods causing dental caries products(p<0.05).

Table 1: Analysis of sugar content according to foods causing dental caries.

Characteristics	Division	Mean±SD	F	p
Foods causing dental caries	Chocolate	7.26±0.153	366.11	0.000
	Candy	9.63±0.115		
	Caramel	10.63±0.153		
	Jelly	10.16±0.115		

3-2. Viscosity analysis according to foods causing dental caries

The measured value for analyzing the difference in viscosity according to the foods causing dental caries represents the average value obtained by measuring the viscosity of the caries food three times.

Caramel 48.83 seconds, candy 31.39 seconds, jelly 13.91 seconds, and chocolate 5.21 seconds were measured in the order of caramel > candy > jelly > chocolate, and

there was a significant difference in all foods causing dental caries products(p<0.05).

Table 2: Viscosity Analysis According to Foods Causing Dental Caries.

Characteristics	Division	Mean±SD	F	p
Foods causing dental caries	chocolate	5.21±1.083	217.13	0.000
	candy	31.39±1.640		
	caramel	48.83±3.683		
	jelly	13.91±1.808		

3) cow's teeth condition soaking according to differences in the viscosity of food.

Table 3: cow's teeth condition soaking according to differences in the viscosity of food.

Characteristics	Division	The state of a cow's teeth
Foods causing dental caries	Chocolate	It fell neatly and didn't have much viscosity.
	Candy	It felt like the whole surface was coated with candy.
	Caramel	It felt like it was partially stained and stuck together.
	Jelly	The jelly stuck together so it didn't come off well.

3-4. Analysis of Adhesion Measurement according to foods causing dental caries.

As a result of measuring the adhesion according to the viscosity of foods causing dental caries with an O'Leary

index only once, the adhesion was measured in the order of candy > caramel > jelly > chocolate with 100 points, 75 points of caramel, 50 points of jelly, and 0 points of chocolate.

Table 4: Analysis of Adhesion Measurement according to foods causing dental caries.

Characteristics	Division	Adhesion			
		O'leary index	PHP index		
			Buccal	Lingual	Average
Foods causing dental caries	Chocolate	0	0	0	0
	Candy	100	5	5	5
	Caramel	75	4	4	4
	Jelly	5	2	0	1

CONSIDERATION

The first body structure you encounter when eating food is the oral cavity, and this oral environment is also affected by many factors, but the oral environment varies depending on the food.

The viscosity and sugar content of foods causing dental caries have the most influence on dental caries.

It is intended to measure the adhesion of teeth according to the sugar content and viscosity of each foods causing dental caries that teenagers often consume, such as candy, jelly, caramel, and chocolate, and to find out which food has more influence on foods causing dental caries through experiments and pay attention to eating foods causing dental caries with high tooth adhesion to prevent foods causing dental caries among teenagers.

In this study, it was thought that the higher the viscosity of foods causing dental caries, the higher the adhesion of the teeth, but as a result of the experiment, foods causing dental caries had the highest viscosity at 48.83 seconds among the four foods causing dental caries (p<0.05), and candy had the highest number at O'Leary index 100 in the tooth adhesion experiment.

However, because various factors such as host factors and pathogen factors work in the experimental environment and in the oral, and each individual has

different eating habits, the degree to which foods causing dental caries remain in the oral is presumed to have a significant impact.

Therefore, the results of the experiment in this study showed that candy had the highest adhesion to teeth.

However, since the adhesion of teeth according to viscosity is a major factor in causing caries, it is expected that foods causing dental caries is most likely to cause foods causing dental caries based on the nature of the food when consumed.

CONCLUSION

This study selected the four most representative foods among caries, measured the sugar content and viscosity of each foods causing dental caries, and measured the tooth adhesion accordingly.

As a result of the experiment to find out each relationship by obtaining the values of sugar content, viscosity, and adhesion of each food, the following conclusions were obtained.

1. The sugar content of foods causing dental caries differed in all foods, followed by caramel> jelly> candy> chocolate(p<0.05).
2. The viscosity of foods causing dental caries differed in all foods and showed the highest significance in caramel(p<0.05).

3. The adhesion of foods causing dental caries differed in all foods, and was measured in the order of candy> caramel> jelly> chocolate.($p<0.05$).

In the above study, there was no correlation between the sugar content and viscosity of foods causing dental caries, and the tooth adhesion was high in the order of candy>caramel>jelly>chocolate.

Therefore, it is considered desirable to pay attention to the consumption of candy and caramel with high tooth adhesion and pay attention to preventing dental caries.

* This research was supported by Choonhae College Of Health Sciences in 2023.

REFERENCES

1. Keyes PH. Present and future measures for dental caries control. J Am Dent Assoc, 1969; 79: 1395-404.
2. Selwitz RH, Ismail AI, Pitts NB. Dental caries. Lancet, 2007; 369: 59-59
3. <https://opendata.hira.or.kr/op/opc/olapHthInsRvStatInfoTab14.do>.
4. <https://www.kdca.go.kr/contents.es?mid=a20601070000>.
5. Ministry of Health and Welfare. 2018 Korea National Children's Oral Health Survey. National statistics No.117051.
6. Fejerskov O. Concepts of dental caries and their consequences for understanding the disease. Community Dent Oral Epidemiol, 1997; 25: 5-12.