Chewing questionnaire Survey Results and Chewing Ability Test

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Citation: Katayama N, Kondo S (2020) Chewing questionnaire Survey Results and Chewing Ability Test. J Food Sci & Nutri: JFSN-103
DOI: 10.46715/2020.06.1000103
Received Date: 4 July, 2020; Accepted Date: 7 July, 2020; Published Date: 13 July 2020

Abstract

Chewing well and eating slowly are good habits for maintaining good health. A slow rise in blood sugar after eating can keep people away from overeating, obesity, and diabetes. In this study, we conducted a subjective self-administered questionnaire survey on chewing and a chewing ability test using chewing ability chewing gum for 34 high school students, 55 university students, and 23 middle-age people who participated in the university festival. To test the chewing ability, a chewing gum manufactured by LOTTE was used. As a result, most of the participants knew xylitol and some word, the 8020 campaign (holding 20 teeth at the age of 80). Also, although many participants could bite apples with skin, a few were confident in their teeth. Many participants replied they were chewing their meals well, but a few participants bite 30 times one bite of food. Participants chewed the chewing ability gum 60 times and the inspector judged the gum color. As a result of chewing gum, the number of participants with sufficient chewing ability (gum color is red) was 2.9% for high school students, 18.2% of university students, and 13.0% of middle age peoples. Many participants had a chewing ability of 4 (gum color is pink) or 3 (gum color is beige). Those with weak chewing ability (gum color is yellowish green) were 8.8% for high school students, 1.8% for university students, and 8.7% for middle age peoples. Many participants found that their chewing ability was rather weak. In order to live long and healthy, firm chewing ability is required. In the future, it may be effective to perform training to chew gum in order to develop chewing ability.

Keywords: Chewing ability gum; Chewing power; Questionnaire survey; University festival

Introduction

Biting stimulates the brain, and the satiety center can be stimulated to control food intake. In Japan, the 8020 campaign has been widely publicized by the government. By the time you are 80 years old, you should have 20 teeth and chew your teeth to eat enough to maintain your nutrition and maintain your health. However, Japanese food is mainly rice, and soft food is the main food. Opportunities to bit and eat hard food have been reduced from 50 years. As for meals, the chances of eating as a family together over time have decreased, and the number of people who eat alone in short time for work and study is increasing. If we eat without chewing in short time, we will eat more food than we need before the stimulation to the satiety center. And our blood sugar level will rise sharply, and excess sugar will accumulate in our body as fat, resulting in obesity. The probability of getting diabetes increases. Therefore, the purpose of this study was to grasp the actual situation by grasping the subjective situation of mastication of people of various ages and actually examining the chewing ability of the people.

Materials and Methods

Participants

Chewing questionnaire Survey and Chewing Ability Test was conducted on 34 high school students, 55 university students, and 23 middle age people who participated in the university festival. Participants voluntarily participated in the chewing questionnaire and chewing ability test.

Chewing questionnaire survey

Participants completed a self-administered questionnaire about nine items related to mastication. Table 1 show the contents of each item.
Chewing Ability Test

To test the chewing ability, a chewing gum manufactured by LOTTE was used. The gum is made to chew 60 times (about one minute) and judge the chewing ability by looking at the color of the gum. The mechanism that changes the color of this gum is that by chewing it, a new neutral/alkaline oral environment can be created by mixing the citric acid and uncolored pigment mixed in the gum with the saliva. The uncolored pigments in the gum are usually colorless under acid. The salivary pH is neutral. By chewing the gum in the oral cavity, neutral saliva and citric acid in the chewing gum mix well, making it neutral and alkaline. This oral reaction changes the gum color from green to red. This phenomenon determines chewing ability. The gum is green (chewing ability 1) at first, then yellowish green (chewing ability 2), beige (chewing ability 3), pink (chewing ability 4), and finally red (chewing ability 5). If chewable, the gum will turn red after 60 chewing times.

Ethical review board

This study conducted with the approval of the Ethical Review Board (Nagoya women's university 'hito wo mochii ta kennyuu ni kansuru iinnkai'). The approval number is 30-7 and 30-17.

Results

Participant results

Participants were 34 high school students, and the average age ± standard deviation was 17.03±0.67. Participants were 55 university students, and the average age ± standard deviation was 20.46±0.54. Participants were 23 Middle-age people, and the average age ± standard deviation was 47.14±2.61.

Table 1 Questionnaire result about mastication

| Question                                      | Yes   | No     | No answer |
|-----------------------------------------------|-------|--------|-----------|
| Do you chew gum everyday?                     | 6 (18%) | 26 (76%) | 2 (6%)    |
| Do you know the word Xylitol?                 | 32 (94%) | 0 (0%)  | 2 (6%)    |
| Do you know the word Myutans?                | 9 (26%) | 25 (74%) |           |
| Can you bite an apple with skin?             | 29 (85%) | 5 (15%) |           |
| Are you confident in your teeth?              | 16 (47%) | 18 (53%) |           |
| Are your teeth strong?                        | 24 (71%) | 10 (29%) |           |
| Do you know the 8020 campaign?               | 23 (68%) | 11 (32%) |           |
| Can you chew the food?                       | 20 (59%) | 14 (41%) |           |
| Can you chew a bite of food 30 times?        | 6 (18%) | 28 (82%) |           |

Table 2: Questionnaire result about mastication for high school students (n=34) (%)

Table 3 shows the results of a questionnaire survey on mastication conducted for university students of participants. There are few university students who chew gum every day and know the word myutans. Everyone knew the name xylitol. High school students also could bit an apple with skin. The University students were not very confident in their teeth, and about half of them thought their teeth were strong. In addition, many high school students know the 8020 campaign, and they say that they often chew food. However, many high school students answered that they did not bit their bite 30 times when they ate the food.
Do you chew gum every day? | Yes (20%) 44 (80%) |
---|---|
Do you know the word Xylitol? | 52 (95%) 3 (5%) |
Do you know the word Mutants? | 30 (55%) 25 (45%) |
Can you bite an apple with skin? | 49 (89%) 6 (11%) |
Are you confident in your teeth? | 18 (33%) 37 (67%) |
Are your teeth strong? | 29 (53%) 26 (47%) |
Do you know the 8020 campaign? | 45 (82%) 10 (18%) |
Can you chew the food? | 22 (40%) 33 (60%) |
Can you chew a bite of food 30 times? | 8 (15%) 47 (85%) |

**Table 3:** Questionnaire result about mastication for female university students (n=55) (%)

Table 4 shows the results of a questionnaire survey on mastication conducted for Middle-age people of participants. There are few Middle-age people who chew gum every day. Every Middle-age people knew the name xylitol. About half of the Middle-age people knew the name Mutants. The Middle-age people also could bit an apple with skin. The Middle-age people were not very confident in their teeth, and about half of them thought their teeth were strong. In addition, many Middle-age people know the 8020 campaign, but they say that they do not often chew food. And Middle-age people answered that they did not bit their bite 30 times when they ate the food.

| Yes | No | No answer |
| --- | --- | --- |
| Do you chew gum every day? | 6 (26%) | 17 (74%) |
| Do you know the word Xylitol? | 23 (100%) | 0 (0%) |
| Do you know the word Mutants? | 15 (65%) | 8 (35%) |
| Can you bite an apple with skin? | 20 (87%) | 3 (13%) |
| Are you confident in your teeth? | 8 (35%) | 15 (65%) |
| Are your teeth strong? | 8 (35%) | 15 (65%) |
| Do you know the 8020 campaign? | 15 (65%) | 8 (35%) |
| Can you chew the food? | 3 (13%) | 20 (87%) |
| Can you chew a bite of food 30 times? | 0 (0%) | 22 (96%) | 1 (4%) |

**Table 4:** Questionnaire result about mastication for middle age (n=23) (%)

**Chewing Ability Test results**

Participants chewed the chew-ability gum 60 times and the inspector judged the gum color (see Table 5 and 6). As a result of chewing gum, the number of participants with sufficient chewing ability (gum color is red) was 2.9% for high school students, 18.2% of university students, and 13.0% of Middle-age peoples. Many participants had a chewing ability of 4 (gum color is pink) or 3 (gum color is beige). Those with weak chewing ability (gum color is yellowish green) were 8.8% for high school students, 1.8% for university students, and 8.7% for Middle-age peoples.

|       | 1 | 2 | 3  | 4 | 5    |
|-------|---|---|----|---|-----|
|       | Green | Yellowish green | Beige | Pink | Red |
| High school students (n=34) | 0 | 3 | 20 | 10 | 1 |
| Female college student (n=55) | 0 | 1 | 15 | 29 | 10 |
| Middle age (n=23) | 0 | 2 | 10 | 8 | 3 |

**Table 5:** Chweing ability test gum color after chweing 60 times (numbers)
The relationship between mastication and cognitive and dementia risk has also been reported. Chewing gum from a young age and getting into the habit of chewing may help preserve oral function and reduce dementia risk: a population-based longitudinal study. Aging 12: 8536-8548.

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**Table 6:** Chewing ability test gum color after chewing 60 times (%)

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| n=34 | n=55 | n=23 | n=34 | n=55 |
| High school students | Female college student | Middle age | High school students | Female college student |
| Green | Yellowish green | Beige | Pink | Red |
| 0 | 1.8 | 27.3 | 34.8 | 1 |
| 8.8 | 27.3 | 34.8 | 1 |
| 58.8 | 29.4 | 2.9 | 1 |
| 2.9 | |

**Discussion**

Most of the people who attended the university festival this time did not have a habit of chewing gum. However, almost everyone knew the word xylitol. But about half of the participants knew the word myutans.

Participants were able to bite the apple with the skin on, but were less confident in the teeth. The 8020 campaign, most participants knew. Participants replied that they chew food well, but did not chew bite 30 times. Participants chewed the chewability test gum. Results chewing ability was 0 (gum color is beige) or 2 (gum color is pink) in all age groups. Few participants were chewing well (gum color is red). It turned out that many people couldn’t bite enough. Past studies have shown that meal times are also working, for example, Middle-age are 6-10 minutes shorter than school students. Also, even for students who should have time, all meal times were within 30 minutes. People were not chewing enough food to eat. Overeating can be prevented by eating the food bite little by little over time. Furthermore, the blood glucose level after meal can be moderated. Previous studies used device development and computational models to measure masticatory force. In addition, there are many reports of studies that clarify the occlusal force. It has been reported that the lack of teeth and the inability to chew sufficiently affect the brain. The relationship between mastication and cognitive and dementia risk has also been reported. I have been reported that oral exercise with gum improves oral function in the elderly. Chewing gum from a young age and getting into the habit of chewing may help preserve oral function and reduce cognitive and dementia risk in the future. From the results of this study, since there are many young people and middle-aged people who do not chew sufficiently, we think that they are better to practice chewing by using chewing ability test gum. And we would like to increase the number of data and report the results in more detail.

**Conclusions**

For 118 people who participated in the university festival, a subjective self-report questionnaire about chewing and chewing ability test using chewing ability gam were conducted.

The participants were 34 high school students, 55 university students, and 23 middle-aged peoples.

**Acknowledgements**

This study was supported by the Japanese Society of Taste Technology, 2019.

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