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A hand wearing a blue nitrile glove holds several small vials and syringes. The labels on the vials are from Chromalox and include information such as 'TOCOPHEROL, D-ALPHA', 'LUTEIN', 'Grade P', 'Lot: 00020311-050', 'Qty: 50mg', 'Store At: +4C', 'Expiry: 3/2019', 'Lot: 00012453-007303', 'Qty: 100mg', 'Store At: -80C', 'Expiry: 6/2022', and 'Lot: 00012453-100'. The background is a blurred image of a person in a white lab coat.

Chewing Ability Test Results

Results of a Questionnaire on Teeth

Highlights

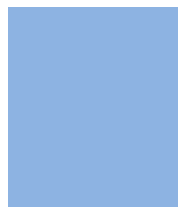
Survey on Gum Chews of Thirty-days

Fundamental Study of Quantitative Evaluation

Discovering Thoughts, Inventing Future



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Results of a Questionnaire on Teeth for 118 People Who Participated in the University Festival

By Naomi Katayama & Shyoko Kondo

Nagoya Women's University

Abstract- A dental questionnaire survey conducted on 34 high school students, 55 university students, 23 Middle-age who participated in the university festival. Participants answered yes or no to ten self-administered questions. Also, participants described the hardness of meals, brushing teeth after meals, and time to spend eating in a questionnaire. As a result, some students even had some gum inflammation. Middle –Ages had many people who had experience with swollen gums (52.2%). Of the participants, the Middle Ages were few who applied fluorine (17.4%), and many were students (high school students 64.7%, university students 90.9%). Most people brush their teeth after breakfast or dinner. Participants replied that they usually eat a little hard (52.0%) or soft (38.1%) food. One high school student replied that he usually eats soft food. The time to eat was longer than breakfast and then dinner, but it was less than 30 minutes ever for dinner. Middle-Ages had an average time to spend eating of fewer than 10 minutes for breakfast, 14 minutes for lunch, and 22 minutes for dinner. Middle ages had shorter meal times in all than students. From the results of the participants; we wondered if they did not chew food very well because they eat soft food in a short time.

Keywords: tooth, questionnaire survey, university festival.

GJMR-K Classification: NLMC Code: WU 100



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Results of a Questionnaire on Teeth for 118 People Who Participated in the University Festival

Naomi Katayama ^α & Shyoko Kondo ^σ

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Keywords: tooth, questionnaire survey, university festival.

I. INTRODUCTION

Unlike primitive people, modern people have smaller jaws and weaker biting power. Maintaining a healthy oral condition helps maintain and improve health. In Japan, there is an 8020 campaign (keeping 20 teeth until age 80). Tooth brushing learned during kindergarten and elementary school, and it needs to teach at home. However, it is often impossible to brush each after meals. It has reported overseas that tooth education has a good effect on tooth brushing ^{1,2)}. Similarly, for other dental care, there is a good point that knowledge and education about teeth motivate ^{3,4)}. It is good to provide oral care because keeping healthy teeth affects our eating habits. Therefore, this study reports the results of a questionnaire survey on teeth for participants who visited the university festival.

Author α: Graduate School of Nagoya Women's University, Nagoya City, Japan.

Corresponding Author α: Nagoya Women's University, Nagoya City, Japan. e-mail: naomik@nagoya-wu.ac.jp

Author σ: Watanabe Hospital, Noma, Aichi, Japan.

II. MATERIALS AND METHODS

a) Participants

Participants were 34 high school students, 55 university students, and 23 middle-age people. Participants voluntarily participated in the survey.

b) Questionnaire survey method

The questionnaire items for teeth shown in Table 2. First of all, the participants answered ten items shown in Table 2 in a self-administered form with a yes or no answer. After that, participants described in the questionnaire about the hardness of meals they usually eat and the average time (minutes) to eat.

Finally, at the time of participation, multiple answers were given when brushing teeth (after breakfast, after lunch, after dinner, after snack).

Table 2: Questionnaire result about tooth (Yes or No)

| |
|---|
| Partial dentures |
| full dentures |
| dentures |
| currently going to the dentist |
| undergoing regular dental check-ups |
| some currently undergoing treatment |
| having toothpaste |
| swollen gums |
| interested in tooth |
| fluorine application in elementary school |

c) Ethical review board

This study conducted with the approval of the Ethical Review Board (Nagoya women's university 'hitowo mochiita kennkyuunikansuru iinnkai'). The approval number is 30-7 and 30-17.

III. RESULTS

a) Participants

Participants were 34 high school students, 55 university students, and 23 middle-age people. Participants voluntarily participated in the survey. Table 1 shows the average and standard deviation (SD) of the age of participants, the average and SD of height, and the average and SD of weight.

Table 1: Average and standard deviation (SD) of participants' age, height and weight

| | Age | Height | Weight |
|-------------------------------|------------------|-------------------|-------------------|
| | Average \pm SD | Average \pm SD | Average \pm SD |
| High school students (n=34) | 17.03 \pm 0.67 | 157.17 \pm 5.12 | 48.27 \pm 6.60 |
| Female college student (n=55) | 20.46 \pm 0.54 | 157.76 \pm 6.20 | 50.35 \pm 4.48 |
| Middle age (n=23) | 47.14 \pm 2.61 | 159.71 \pm 8.43 | 54.94 \pm 10.10 |

b) Questionnaire results

Among the participants, 34 high school students answered ten questions about teeth, as shown in Table 3. High school students answered that they had

no partial or full dentures. However, there were high school students who answered that the gums had swollen (35.3%).

Table 3: Questionnaire result about tooth for high school students (n=34)

| | Yes | No | No answer |
|---|-----|----|-----------|
| Partial dentures | 0 | 34 | |
| full dentures | 0 | 34 | |
| dentures | 1 | 33 | |
| currently going to the dentist | 13 | 21 | |
| undergoing regular dental check-ups | 3 | 31 | |
| some currently undergoing treatment | 3 | 31 | |
| having toothpaste | 13 | 21 | |
| swollen gums | 12 | 22 | |
| interested in tooth | 13 | 21 | |
| fluorine application in elementary school | 22 | 10 | 2 |

Table 4 shows the results of questions about dental that university students made. Similar to high school students, university students do not have partial

or full dentures, but someone had swollen gums (25.5%). Also, more university students applied fluoride to their teeth (90.9%) than high school students (64.7%).

Table 4: Questionnaire result about tooth for female university students (n=55)

| | Yes | No | No answer |
|---|-----|----|-----------|
| Partial dentures | 0 | 55 | |
| full dentures | 0 | 55 | |
| dentures | 1 | 54 | |
| currently going to the dentist | 6 | 49 | |
| undergoing regular dental check-ups | 19 | 36 | |
| some currently undergoing treatment | 3 | 52 | |
| having toothpaste | 11 | 44 | |
| swollen gums | 14 | 41 | |
| interested in tooth | 23 | 32 | |
| fluorine application in elementary school | 50 | 4 | 1 |

Table 5 shows the results of the questionnaire regarding middle-age teeth. The middle-age also had

no a trial or full dentures. Middle Age often had swollen gums (52.2%), and few of them applied fluoride (17.4%).

Table 5: Questionnaire result about tooth for middle age (n=23)

| | Yes | No | No answer |
|---|-----|----|-----------|
| Partial dentures | 0 | 23 | |
| full dentures | 0 | 23 | |
| dentures | 10 | 13 | |
| currently going to the dentist | 3 | 20 | |
| undergoing regular dental check-ups | 8 | 15 | |
| some currently undergoing treatment | 3 | 20 | |
| having toothpaste | 17 | 6 | |
| swollen gums | 12 | 11 | |
| interested in tooth | 10 | 13 | |
| fluorine application in elementary school | 4 | 19 | |

We asked the participants about the hardness of the food they usually eat (see Table 6 and 7). As a result, most participants answered that the foods they usually eat were a little hard or a little soft. However, a high school student answered the question that she eat soft food.

Table 6: Hardness of the usually-eat-meal (n=112)

| | Hard | Slightly hard | Slightly soft | Soft | No answer |
|-------------------------------|------|---------------|---------------|------|-----------|
| High school students (n=34) | 1 | 17 | 13 | 1 | 2 |
| Female college student (n=55) | 3 | 33 | 18 | 0 | 1 |
| Middle age (n=23) | 2 | 10 | 10 | 0 | 1 |

Table 7: Hardness of the usually-eat-meal (%) (n=112)

| | Hard | Slightly hard | Slightly soft | Soft | No answer |
|-------------------------------|------|---------------|---------------|------|-----------|
| High school students (n=34) | 2.9 | 50 | 38.2 | 2.9 | 5.9 |
| Female college student (n=55) | 5.5 | 60.0 | 32.7 | 0.0 | 1.8 |
| Middle age (n=23) | 8.7 | 43.5 | 43.5 | 0 | 4.3 |

We asked the participants about the time to eat lunch than breakfast and more dinner than lunch. But (see Table 8). As a result, they were spending more the middle-ages took less time in all than the students.

Table 8: Comparison of average time \pm standard deviation for one meal (minute)

| | Breakfast | Runch | Dinner |
|-------------------------------|----------------|----------------|-----------------|
| High school students (n=34) | 14.1 \pm 6.3 | 22.9 \pm 8.4 | 29.1 \pm 12.6 |
| Female college student (n=55) | 14.6 \pm 9.4 | 21.9 \pm 9.2 | 28.4 \pm 14.8 |
| Middle age (n=23) | 9.8 \pm 3.3 | 13.6 \pm 5.6 | 21.6 \pm 12.7 |

The participants asked whether they would brush their teeth after eating with multiple answers (see Table 9). As a result, most participants answered that they would brush their teeth after breakfast and dinner. They would not polish after lunch.

Table 9: Brush the teeth every time or not (numbers)

| | Morning | Daytime | Night | Do not |
|-------------------------------|---------|---------|-------|--------|
| High school students (n=34) | 24 | 1 | 24 | 0 |
| Female college student (n=55) | 44 | 1 | 44 | 0 |
| Middle age (n=23) | 12 | 3 | 11 | 0 |

IV. DISCUSSION

As a result of questions about teeth to people who attended this university festival, no one had full or partial dentures until the middle-ages. Most participants answered that they would brush their teeth after breakfast and dinner. They would not polish after lunch. It reported that many students abroad brush their teeth twice or more a day ⁵⁾. In particular, females brushed their teeth better than males and used dental floss ^{5,6)}. The participants in the middle-ages were applying fluoride than students, and many had swollen gums. Also, the time to spend eating for breakfast and lunch were short and tended to eat soft foods. Middle-ages are the age that requires the prevention of alveolar pyorrhea, and maintaining 20 teeth by the age of 80 is likely to be difficult if the teeth are not valued. It has reported that the results of middle-age teeth surveys overseas also indicate that gingivitis and inflammation around the teeth are common ⁷⁾. And education should be provided from the perspective of public health ⁷⁾. Many participants, ever student, have experience with swollen gums. It reported that a few Japanese people control plaque ⁸⁾. It also reported that there are many Koreans who are the same Asian people who bleed from their gums when brushing their teeth compared to Americans ⁹⁾. Since the staple food of Asians is rice, it may be one of the causes of gingivitis that it is tender and sticky and easily attaches to teeth. Also, in this study, since a high school student answered that she usually eats soft foods, we thought it would be good to investigate how much chewing power they had. The Japanese staple food is rice, which is soft, so we would like to find out if it has enough chewing power.

V. CONCLUSIONS

A questionnaire survey on teeth was conducted for this school students, university students, Middle Ages who participated in the university festival. As a result, many young students had swollen gums, and few the middle-ages were applying fluoride. Participants replied that they would eat either hard or soft food in their usual diet. Participants spent less time (20-30 minutes) on meals of all ages, with Middle Age having breakfast within 10 minutes, lunch within 15 minutes, and dinner around 20 minutes. There are many soft foods in the Japanese diet, and we would like to find out by grasping whether or not they have sufficient chewing power.

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Fundamental Study of Quantitative Evaluation of Radio Wave Output of Wireless Medical Telemetry Transmitters Operable in Medical Field

By Kiyotaka Fujii, Kazumasa Kishimoto & Munenori Inoue

Abstract- Wireless medical telemetry systems (WMTSs) are important medical equipment for monitoring of biological information such as the electrocardiogram of a patient in a remote location in real time. However, because WMTSs have characteristically used channels that are unique to the radio wave spectrum, many institutions have not previously managed WMTSs. Therefore, we examined a method for quantitative evaluation of the radio wave output of a wireless medical telemetry transmitter (WMTT) that can even be implemented in the medical field. In the experiments, we demonstrated the possibility of use of the method for quantitative evaluation of WMTT radio wave output in the medical field using two types of radio wave propagation model: a free-space propagation model and a two-ray ground reflection model. To determine the reference threshold value for use of each model, a breakpoint was found to be important to grasp the change point between short distance and long distance. It was indicated that the measured value was lower than the theoretical value below the breakpoint, while the measured value was slightly higher than the theoretical value beyond the breakpoint.

Keywords: wireless medical telemetry transmitter, distance characteristics, free-space propagation model, two-ray ground reflection model.

GJMR-K Classification: NLMC Code: QS 26



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Kiyotaka Fujii ^α, Kazumasa Kishimoto ^σ & Munenori Inoue ^ρ

Abstract- Wireless medical telemetry systems (WMTSs) are important medical equipment for monitoring of biological information such as the electrocardiogram of a patient in a remote location in real time. However, because WMTSs have characteristically used channels that are unique to the radio wave spectrum, many institutions have not previously managed WMTSs. Therefore, we examined a method for quantitative evaluation of the radio wave output of a wireless medical telemetry transmitter (WMTT) that can even be implemented in the medical field. In the experiments, we demonstrated the possibility of use of the method for quantitative evaluation of WMTT radio wave output in the medical field using two types of radio wave propagation model: a free-space propagation model and a two-ray ground reflection model. To determine the reference threshold value for use of each model, a breakpoint was found to be important to grasp the change point between short distance and long distance. It was indicated that the measured value was lower than the theoretical value below the breakpoint, while the measured value was slightly higher than the theoretical value beyond the breakpoint.

Keywords: wireless medical telemetry transmitter, distance characteristics, free-space propagation model, two-ray ground reflection model.

1. INTRODUCTION

The Ministry of Health, Labor and Welfare established medical equipment safety managers for all medical institutions in an April 2007 revision of medical law, along with training for the safe use of medical equipment, training for all medical equipment maintenance planning and implementation, and information gathering for safe use of the equipment [1]. Wireless medical telemetry systems (WMTSs) are important medical equipment that can monitor biological information such as the electrocardiogram of a patient in a remote location in real time. However, because WMTSs have characteristically used channels unique to the radio wave spectrum, many institutions have not previously managed WMTSs.

A report produced by the Electromagnetic Compatibility Conference Japan stated that although the introduction of WMTSs was particularly advanced in middle-and large-scale hospitals with more than 100

beds, the overall implementation of the required radio channel management was only 48.1% and, even in the case of larger hospitals with 200 beds or more, only reached as high as 56.0% [2].

Examples of the main problems related to WMTS include radio waves not reaching their intended destinations, cross talk and electromagnetic noise, electromagnetic interference from other devices, and radio channel interference between proximal hospitals. These problems can be serious in some cases. A WMTS is generally configured as a complex system that includes a sensor, a wireless medical telemetry transmitter (WMTT), an antenna system, a patient monitor and other items of equipment. Therefore, in addition to the difficulties involved in maintenance management in the medical field, it has not been easy to investigate the cause when trouble occurs within these systems.

In previous research, although the electromagnetic interference between the WMTS and equipment such as a light-emitting diode (LED) has been demonstrated, the results presented did not represent a performance evaluation of the WMTT itself [3, 4, 5]. In addition, another report measured the reception limit distance to determine whether a signal can be received [6]. When using this reporting method, a space of approximately 100 m in the line of sight is required and such a space requirement is difficult to execute in the medical field. Additionally, the threshold of the transmission limit distance remains unclear and there is a high possibility that this threshold is influenced by artifacts such as obstacles.

Therefore, in this study, we aimed to clarify two points. The first point involved calculating the distance characteristics of the radio wave output from the WMTT using a simple radio wave propagation model and thus enabling derivation of the threshold value at each distance value. The second point involved was to evaluate the appropriateness of the threshold values derived as part of the first point by actually measuring the radio wave output of a WMTT used in the medical field. Based on the above, we then examined a method for quantitative evaluation of the radio wave output of a WMTT that can be implemented even in the medical field.

Author ^α ^σ ^ρ: Kobe City Nishi-Kobe Medical Center, Kobe City, Japan.
e-mails: sphu7xq9@gmail.com, ce.kazu@gmail.com,
qqcq5db9k@utopia.ocn.ne.jp

II. METHOD

According to a standard produced by the Association of Radio Industries and Businesses, the value measured when a power meter is connected to an aerial terminal is defined as the aerial power (P ; units: W), and in the case of the class A transmitter, which is mainly used in the medical field, P is specified to be 1 mW or less [7].

Because it is difficult to measure the aerial power of the WMTT in the medical field, the voltage at the receiver input (V ; units: dB μ V) at the spectrum analyzer was taken to be the radio wave output. In addition, because radio waves are attenuated over distance, the voltage received at the receiver input also varies with distance.

Therefore, to study the measurement conditions and the threshold value, the theoretical value was first calculated using the radio wave propagation model and the result was then compared with the actual measured value from radio wave output measurements in the medical field.

a) Distance characteristics of radio wave output when using the radio wave propagation model

When the unit conversion formulas (1) and (2) were used for conversion from power into voltage, 1 mW was converted into approximately 107 dB μ V for a system with 50 Ω impedance (R unit: Ω).

$$\text{dB}\mu\text{V} = 20 \log_{10} \left(\frac{V}{1\mu\text{V}} \right) \quad (1)$$

$$\text{dB}\mu\text{V} = 20 \log_{10} (\sqrt{RP} \times 10^6) \quad (2)$$

For the radio wave propagation model, both the free-space propagation model and the two-ray ground reflection model were used. By subtracting the propagation loss derived from each model from the 107 dB μ V value calculated above, the distance characteristics of the radio wave output were acquired. The propagation distances were set at 0.1 m, 0.3 m, 0.5 m, 1.0 m, and 3.0 m, and over the range from 5.0 m to 50 m in steps of 5.0 m.

i. Free-space propagation model

The transmission power (P_t) and the reception power (P_r) are calculated from the transmission formula of the Friis Transmission Equation using the antenna gains (G_t , G_r), the propagation distance (d), and the wavelength (λ) [8]. The free space radio propagation loss (L_f) was calculated from equation (4). Assuming that isotropic antennas were used for both the transmitting and receiving antennas, the basic free-space model propagation loss (L_B ; units: dB) was calculated using equation (5).

$$\frac{P_r}{P_t} = \frac{1}{L} G_r G_t \quad (3)$$

$$L_f = \left(\frac{4\pi d}{\lambda} \right)^2 \quad (4)$$

$$L_B = 10 \log_{10} \left(\frac{4\pi d}{\lambda} \right)^2 \quad (5)$$

ii. Two-ray ground reflection model

In line-of-sight propagation, the two-ray ground reflection model can be expressed using equations (6) and (7) using the transmission power and the reception power (i.e., P_t and P_r , respectively). $\Delta\phi$ is the phase difference due to the distance difference between the two radio waves, and h_t and h_r are the transmitting and receiving antenna heights, respectively [9]. The break point (d_b) at which the distance attenuation tendency changes is defined by equation (8). The distance attenuation was calculated using equation (9) for short distances and equation (10) for long distances with the break point acting as the boundary. For short distances from the break point, the direct wave and the reflected wave are both fading, but in this case, the average value was used.

Assuming that isotropic antennas were used for both the transmitting and receiving antennas, the basic radio wave propagation losses (L_{t1} , L_{t2} ; units: dB) of the two-ray ground reflection model were then calculated.

$$\frac{P_r}{P_t} = \left\{ \frac{\lambda}{2\pi d} \sin \left(\frac{\Delta\phi}{2} \right) \right\}^2 G_r G_t \quad (6)$$

$$\Delta\phi \approx \frac{4\pi h_r h_t}{\lambda d} \quad (7)$$

$$d_b = \frac{4h_r h_t}{\lambda} \quad (8)$$

$$L_{t1} = 10 \log_{10} 2 \left(\frac{2\pi d}{\lambda} \right)^2 \quad (9)$$

$$L_{t2} = 10 \log_{10} \left(\frac{d^2}{h_r h_t} \right) \quad (10)$$

For both models, the WMTT transmission frequency was calculated to be 448.8000 MHz.

b) Radio wave output measurement experiment in the medical field

To simulate line-of-sight propagation in the medical field, a measurement experiment was conducted in a corridor on the 3rd floor of our hospital. External waves that could interfere with the operating frequency range (420 MHz to 450 MHz) of the WMTT from the exterior have not been confirmed. We measured the radio wave output of the WMTT (ZS-630P, Nihon Kohden, Co., Ltd.) using a spectrum analyzer (HAS9101B, Willtek). The specifications of this WMTT

are listed in Table 1. The transmission frequency of the WMTT was 448.8000 MHz.

The spectrum analyzer and the WMTT were installed at a height above the floor of 1 m (Fig.1), and the distance characteristic of the WMTT was set to be equal to the distance characteristic of the radio wave output obtained using the radio wave propagation

model (Fig.2: Point A to point B). Measurements were performed with Max Hold after sweeping for 30 s and were acquired three times for each propagation distance. The measurement data were first converted into an antilogarithm and then the data from the three measurement sets were averaged and expressed in $\text{dB}\mu\text{V}$.

Table 1: Specifications of the wireless medical telemetry transmitter

| Specification | Value |
|----------------------|---|
| Operation mode | Type-A (digital) |
| Modulation method | Frequency shift keying (FSK) |
| Type of radio wave | F7D |
| Center frequencies | 420 to 440 MHz (Channel changeable type) |
| Occupied bandwidth | 8.5 kHz |
| Transmitting antenna | Electrode lead, Built in, Probe for oxygen saturation rate in blood |
| Output power | 1 mW |

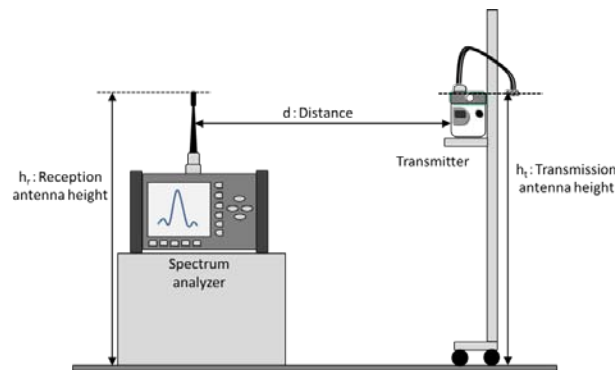


Fig. 1: Schematic of radio wave output measurement experiment.

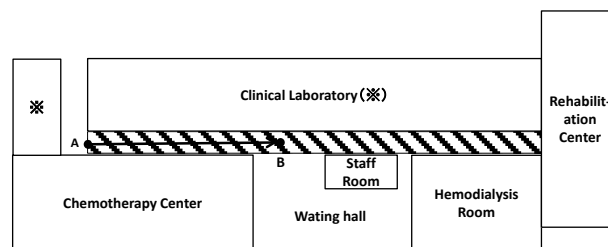


Fig. 2: Radio wave output measurement experiment in the medical field.

III. RESULTS

a) Distance characteristics of radio wave output using the radio wave propagation model

We show the distance characteristics of the radio wave output that were determined using the radio wave propagation model in Fig.3, and the corresponding values are presented in Table 2. Because the break point is approximately 6.0 m, the formula for L_{t1} was used for the distances up to 5.0 m and the formula for L_{t2} was used for the distances of 10 m and over. When L_B and L_{t1} were compared, their tendencies were the same, with the intercept component of LB being only approximately 3 dB larger than that of L_{t1}

(equations (5) and (9), respectively). In contrast, when L_B and L_{t2} were compared, L_{t2} increased abruptly with d^4 with respect to the increase with d^2 for LB (equations (5) and (10), respectively). Therefore, the radio wave output was reversed after the break point.

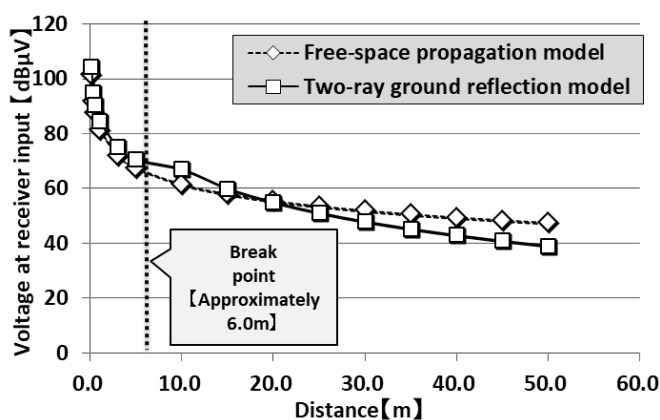


Fig. 3: Comparison of distance characteristics of the radio wave output when using the radio wave propagation model.

b) Radio wave output measurement experiment in the medical field

We show the relationship between the distance characteristics of the actual value of the radio wave output in the medical field and the radio wave output determined using the radio wave propagation model here (Fig.4).The corresponding numerical values are presented in Table 2.In both the free-space propagation model and the two-ray ground reflection model, reversal of the measured value in the medical field occurred after the breakpoint.

We also present the results of a regression analysis of the measured values in the medical field and those from the radio wave propagation model (Fig.5).

In addition, when we investigated the correlation between the free-space propagation model and the measured values in the medical field, a regression equation of $y=0.6177x+24.629$ ($R^2=0.911$) was obtained.

Similarly, for the relationship between the two-ray ground reflection model and the measured value in the medical field, a regression equation of $y=0.5185x+31.436$ ($R^2=0.9354$) was obtained.

Table 2: Radio wave outputs obtained using the radio wave propagation model and measured values in the medical field

| Distance [m] | Free-space propagation model [dB μ V] | Two-ray ground reflection model [dB μ V] | Measured value in medical field [dB μ V] | | | |
|--------------|---------------------------------------|--|--|------|------|---------|
| | | | 1st | 2nd | 3rd | Average |
| 0.1 | 101.5 | 104.5 | 90.2 | 88.9 | 88.5 | 89.2 |
| 0.3 | 92.0 | 95.0 | 81.6 | 83.6 | 80.2 | 81.9 |
| 0.5 | 87.5 | 90.6 | 74.4 | 76.6 | 78.8 | 76.8 |
| 1.0 | 81.5 | 84.5 | 72.8 | 68.3 | 69.9 | 70.5 |
| 3.0 | 72.0 | 75.0 | 65.7 | 69.3 | 65.5 | 67.0 |
| 5.0 | 67.5 | 70.6 | 67.5 | 67.0 | 66.3 | 66.9 |
| 10.0 | 61.5 | 67.0 | 64.5 | 64.4 | 64.5 | 64.5 |
| 15.0 | 58.0 | 60.0 | 66.6 | 66.3 | 66.4 | 66.4 |
| 20.0 | 55.5 | 55.0 | 62.3 | 63.8 | 64.5 | 63.6 |
| 25.0 | 53.6 | 51.1 | 62.2 | 62.8 | 62.6 | 62.5 |
| 30.0 | 52.0 | 47.9 | 57.3 | 56.7 | 57.4 | 57.1 |
| 35.0 | 50.6 | 45.2 | 54.0 | 54.8 | 53.8 | 54.2 |
| 40.0 | 49.5 | 42.9 | 54.4 | 53.5 | 53.1 | 53.7 |
| 45.0 | 48.5 | 40.9 | 49.2 | 49.4 | 49.6 | 49.4 |
| 50.0 | 47.5 | 39.0 | 50.7 | 48.7 | 50.8 | 50.1 |

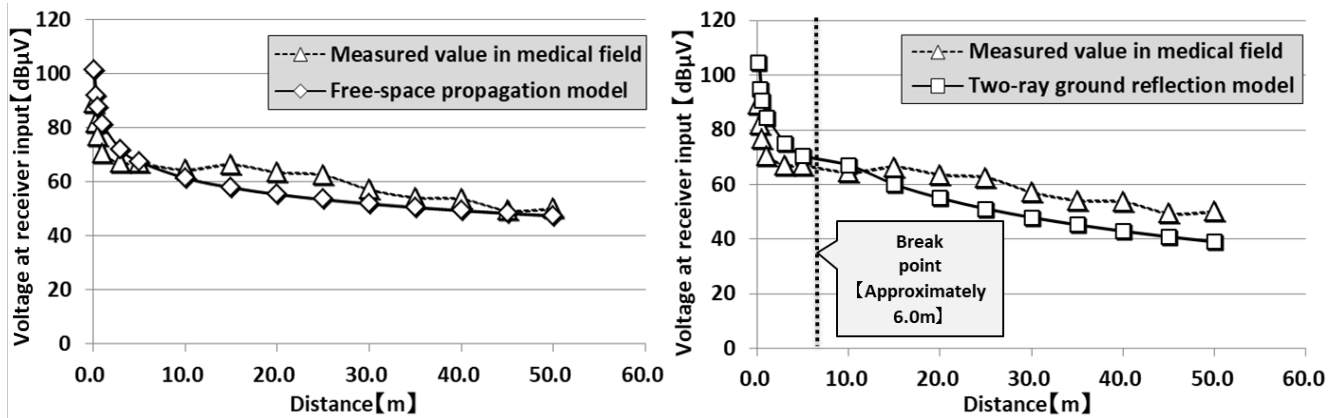


Fig. 4: Comparison of distance characteristics of the measured values in the medical field and those from the radio wave propagation model.

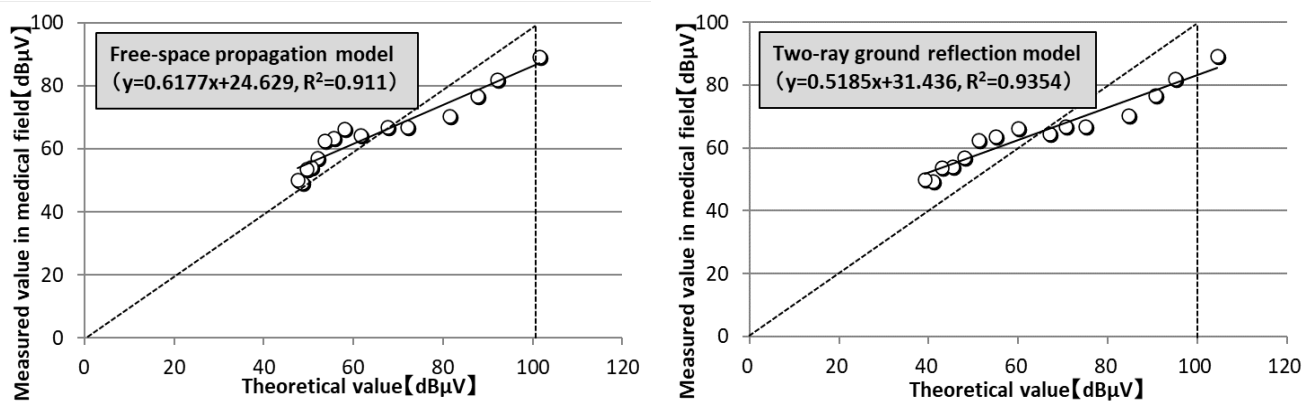


Fig. 5: Regression analysis results for the measured values in the medical field and those obtained from the radio wave propagation model.

IV. DISCUSSION

a) Comparison of radio wave outputs when using radio wave propagation model and measured values in the medical field

With regard to the relationship between the measured values in the medical field and those obtained from the radio wave propagation model, it was proposed from the results of the regression analysis that both models can be used for threshold estimation of the distance characteristic.

In contrast, we focus on comparison of the distance characteristics of the measured values in the medical field with those obtained from the radio wave propagation model. In both the free-space propagation model and the two-ray ground reflection model, a reversal of the measured value occurred in the medical field near the break point. From the above, it is considered that this represents the tendency changing between the short distance and long distance conditions. When compared with the radio wave propagation model values, the measured values in the medical field tended to be low at short distances and high at long distances. The break point is the point

where the influence of the Earth begins to appear in the first Fresnel zone. It is considered to be important as a guide to the points that represent the change between short distance and long distance conditions.

b) Quantitative evaluation method of radio wave output of WMTT in the medical field

Based on the above, we make the following assumptions during measurement of the radio wave output of the WMTT in the medical field. Two specific situations were considered: measurement in the medical equipment management room and measurement in the ward. Because it is important to understand the break point in both situations, the break point was calculated in advance.

First, when taking the measurements in the medical equipment management room, it was assumed that the propagation distance would be smaller than the break point. This is because the medical equipment management room is often small. Therefore, given that the measured value was slightly lower than the calculated value obtained from the radio wave output using the radio wave propagation model, the threshold value was set based on the propagation distance.

Second, when taking the measurements in a ward, it was assumed that the propagation distance will be greater than the break point. This is because the measurements are taken in a larger space. Therefore, given that the measured value was slightly higher than the calculated value obtained from the radio wave output using the radio wave propagation model, the threshold value was set based on the propagation distance.

c) *Limitations of this study*

This study has some limitations. First, there is a problem with the experimental environment. This experiment was performed with an antenna height of 1 m, a corridor width of 2.8 m (distance in the horizontal direction to the measurement point: 1.4 m) and a ceiling height of 2.6 m (distance in the vertical direction from the measurement point: 1.6 m) only. In contrast, in the actual measurement environment, the distances to the wall surfaces, the floor surface and the ceiling are varied. It is undeniable that the measured value may show different tendencies if the environment is different.

Second, there is the problem of the antenna gain. In this work, the antennas were assumed to be isotropic antennas and the theoretical values were calculated on this basis. Although the isotropic antenna is a virtual antenna, it is very difficult to grasp the antenna gain accurately in the medical field. Therefore, we adopted a method that any researcher can calculate easily.

Finally, there is a problem with the WMTT model used. In the experiments, only one model of WMTT produced by one manufacturer was tested. The actual measurement values would undoubtedly differ when obtained using equipment from other manufacturers and different models.

V. CONCLUSION

In this work, while assuming line-of-sight propagation, we have demonstrated the possibility of quantifying radio wave output in the medical field using two types of radio wave propagation model: a free-space propagation model and a two-ray ground reflection model. To determine a reference threshold value when using each model, determination of a break point is important to grasp the change point between the short distance and long distance conditions.

It was found that the measured value was lower than the theoretical value below the break point, but the measured value was then slightly higher than the theoretical value beyond the break point.

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Chewing Questionnaire Survey Results and Chewing Ability Test Results of 118 People Who Participated in the University Festival

By Naomi Katayama & Shoko Kondo

Nagoya Women's University

Abstract- Chewing well and eat 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-aged people who participated in the university festival. The chewing ability test, a chewing gum manufactured by LOTTE 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 chew-ability gum 60 times, and the inspector judged the gum color.

Keywords: chewing power, chewing ability gum, questionnaire survey, university festival.

GJMR-K Classification: NLMC Code: WA 900



CHEWINGQUESTIONNAIRESURVEYRESULTSANDCHEWINGABILITYTESTRESULTSOF118PEOPLEWHOPARTICIPATEDINTHEUNIVERSITYFESTIVAL

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Chewing Questionnaire Survey Results and Chewing Ability Test Results of 118 People Who Participated in the University Festival

Naomi Katayama ^α & Shoko Kondo ^σ

Abstract- Chewing well and eat 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-aged people who participated in the university festival. The chewing ability test, a chewing gum manufactured by LOTTE 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 chew-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 the 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. To live long and healthy, the firm chewing ability required. In the future, it may be well to perform training to chew gum to develop chewing ability.

Keywords: chewing power, chewing ability gum, questionnaire survey, university festival.

I. INTRODUCTION

Biting stimulates the brain, and the satiety center can stimulated to control food intake. In Japan, the 8020 campaign has 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 staple food. Opportunities to bit and eat hard food have been reducing 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

a short time for work and study is increasing. If we eat without chewing in a 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 of the mastication of people of various ages and examining the chewing ability of the people.

II. MATERIALS AND METHODS

a) Participants

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

b) Chewing questionnaire survey

Participants completed a self-administered questionnaire about nine items related to chewing. Table 1 shows the contents of each item.

Table 1: Questionnaire result about mastication

Do you chew gum everyday?
Do you know the word Xylitol?
Do you know the word Mutants?
Can you bite an apple with skin?
Are you confident in your teeth?
Are your teeth strong?
Do you know the 8020 campaign?
Can you chew the food?
Can you chew a bite of food 30 times?

c) Chewing Ability Test

The chewing ability test, a chewing gum manufactured by LOTTE used. The gum made for

Author α: Graduate School of Nagoya Women's University, Nagoya City, Japan.

Corresponding Author α: Nagoya Women's University, Nagoya City, Japan. e-mail: naomik@nagoya-wu.ac.jp

Author σ: Watanabe Hospital, Noma, Aichi, Japan.

chewing 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.

d) Ethical review board

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

III. RESULTS

a) Participant results

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

b) Questionnaire survey results

Table 2 shows the results of a questionnaire survey on mastication conducted for high school students of participants. There are few high school students can chew gum everyday and know the word mutants. Everyone knew the name xylitol. High school students also could bite an apple with skin and thought they had firm teeth. Also, 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.

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

| | 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 Mutants? | 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 3 shows the results of a questionnaire survey on mastication conducted for university students of participants. There are few university students can chew gum everyday. Most university students knew the name xylitol. About half of the university students knew the name mutants. The university students also could bite an apple with skin. The University students were not very confident in their teeth, and about half of them thought their teeth were firm. Also, many university students know the 8020 campaign, but they say that they do not often chew food. And many university students answered that they did not bit their bite 30 times when they ate the food.

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

| | Yes | No |
|--|-----------------|-----------------|
| Do you chew gum everyday? | 11 (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 4 shows the results of a questionnaire survey on mastication conducted for the middle-age people of participants. There are few middle-age people can chew gum everyday. All of the middle-age people knew the name xylitol. About half of the middle-age people knew the name of mutants. Middle-age people also could bite an apple with skin. The middle-age

people were not very confident in their teeth, and about half of them thought their teeth were firm. Also, 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.

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

| | Yes | No | No answer |
|--|------------------|-----------------|---------------|
| Do you chew gum everyday? | 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%) |

c) 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 the middle-age peoples. Many participants had a chewing ability of 4 (gum color is pink) or 3 (gum color is beige). Those with the 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.

Table 5: Chewing ability test gum color after chewing 60 times (numbers)

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

| | 1 | 2 | 3 | 4 | 5 |
|-------------------------------|-------|-----------------|-------|------|------|
| | Green | Yellowish green | Beige | Pink | Red |
| High school students (n=34) | 0 | 8.8 | 58.8 | 29.4 | 2.9 |
| Female college student (n=55) | 0.0 | 1.8 | 27.3 | 52.7 | 18.2 |
| Middle age (n=23) | 0 | 8.7 | 43.5 | 34.8 | 13 |

IV. 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 mutants.

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 30 times. Participants chewed the chew ability test gum. Results chewing ability was 2 (gum color is beige) or 3 (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 the time to spend eating are also working; for example, middle-age is 6-10 minutes shorter than school students. Also, even for students who should have time, all the times to spend eating were within 30 minutes. People were not chewing enough food to eat. Overeating can prevented by eating the food bite little by little over time.

Furthermore, the blood glucose level after a meal can moderated. Previous studies used device development and computational models to measure masticatory force ^{1,2)}. Also, there are many reports of studies that clarify the occlusal force ^{1,2,3,4)}. It has reported that the lack of teeth and the inability to shew sufficiently affect the brain ⁵⁾. The relationship between chewing and cognitive and dementia risk has also been reported ⁶⁾. I have reported that oral exercise with gum improves oral function in the elderly ⁷⁾. 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.

V. CONCLUSIONS

For 118 people who participated in the university festival, a subjective self-report questionnaire about chewing and chewing ability tests using chewing ability gum conducted. The participants were 34 high school students, 55 university students, and 23 middle-aged people.

ACKNOWLEDGEMENTS

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Results of Questionnaire Survey on Gum Chews of Thirty-Days for University Female Students

By Naomi Katayama & Shoko Kondo

Nagoya Women's University

Abstract- It had pointed out that modern people have a weakening ability to bite. The media had reported that the number of children with weak chewing power has increased since the 1980s, and the media were concerned about their future health. Therefore, in this study, we conducted a questionnaire survey after chewing ability training after chewing gum once a day for one month for chewing ability training. As a result, 23 female university students participated, and after 30 days, six people answered that they got chewing ability by chewing gum everyday. Also, eight people answered that they felt that their jaw had strengthened. And five of the participants answered that saliva secretion had improved. Six of the participants replied that they had reduced their snack intake. However, of the 23 participants, eight could not chew the gum daily for 30 days. Also, 13 out of 23 of the participants replied that chewing gum every day for 30 days was hard to do. In the future, we would like to enlighten people to develop chewing ability training by making a habit of chewing gum everyday.

Keywords: *chewing training, chewing gum, questionnaire survey, university female students.*

GJMR-K Classification: NLMC Code: WA 900



RESULTS OF QUESTIONNAIRE SURVEY ON GUM CHEW OF THIRTY DAYS FOR UNIVERSITY FEMALE STUDENTS

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Results of Questionnaire Survey on Gum Chews of Thirty-Days for University Female Students

Naomi Katayama ^α & Shoko Kondo ^σ

Abstract- It had pointed out that modern people have a weakening ability to bite. The media had reported that the number of children with weak chewing power has increased since the 1980s, and the media were concerned about their future health. Therefore, in this study, we conducted a questionnaire survey after chewing ability training after chewing gum once a day for one month for chewing ability training. As a result, 23 female university students participated, and after 30 days, six people answered that they got chewing ability by chewing gum everyday. Also, eight people answered that they felt that their jaw had strengthened. And five of the participants answered that saliva secretion had improved. Six of the participants replied that they had reduced their snack intake. However, of the 23 participants, eight could not chew the gum daily for 30 days. Also, 13 out of 23 of the participants replied that chewing gum every day for 30 days was hard to do. In the future, we would like to enlighten people to develop chewing ability training by making a habit of chewing gum everyday.

Keywords: chewing training, chewing gum, questionnaire survey, university female students.

I. INTRODUCTION

It has pointed out that modern people in Japan have reduced masticatory power. The number of soft foods increased, and the number of children with weak chewing power increased in the 1980s. The kindergarten scene and experts pointed out one after another, and the media coverage of children with weak chewing

power also taken up. Experts are worried about the future of these poorly chewable children. Because, if the force of chewing is weak, the muscles for chewing and the bones of the jaw not sufficiently developed, which causes disorder of the alignment of teeth and temporomandibular disorders. Also, if you can chew well after growth, your jaw will move well, and the blood flow to the brain will increase, and the brain will become active, which will help prevent blurring and dementia. Therefore, in this study, we conducted a self-administered questionnaire survey after chewing gum for one day one time during a month to 23 female university students who understood the study contents and agreed to the consent form, and report the results.

II. MATERIALS AND METHODS

a) Participants

In this study, 23 female university students participated. They understood the study contents and agreed to the consent form.

b) Chewing questionnaire survey

Participants had the gum chewed for one minute every day for 30 days. After that, a self-administered questionnaire survey conducted for the participants. The questionnaire items shown in Table 1.

Table 1: Questionnaire survey about 30 days of chewing xylitol gum

Could you chew the gum for 30 days?
Was it hard to chew gum everyday?
Did chewing gum change your appetite?
Do you think chewing gum has improved your chewing ability?
Do you think chewing gum helps improve saliva secretion?
Do you think chewing gum prevented your mouth from getting dry?
Do you think chewing gum reduce your dietary intake?
Do you think that chewing gum gives your jaw more strength?
Did chewing gum reduce your snack intake?

Author α: Graduate School of Nagoya Women's University, Nagoya City, Japan.

Corresponding Author α: Nagoya Women's University, Nagoya City, Japan. e-mail: naomik@nagoya-wu.ac.jp

Author σ: Watanabe Hospital, Noma, Aichi, Japan

c) Ethical review board

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

III. RESULTS

a) Questionnaire survey results

The results show in Table 2 and 3. The average age of female university students \pm standard deviation was 20.6 ± 0.5 . The results of the questionnaire survey were as follows. Every day, 15 people chewed gum for 30 days. Also, 15 people said that chewing gum every day was hard to do. The chewing gum was most common in the morning and afternoon, with six participants each. Three participants answered that chewing gum reduced their appetite. Six participants replied that they were chewing well by chewing the gum. Five participants answered that they thought that

chewing gum improved salivation. Eight participants said that they thought they were less thirsty. Two participants replied that they thought they were eating less. Eight participants answered that they thought they had jaw strength. Also, in the comments section of some participants, there were comments such as thinking that they started chewing food well, that they could chew, and that they felt their jaws became stronger. A further six participants replied that they were eating less snacks. In the comment section, there was a note that they were not hangry because they felt full. There was also a note that chewing gum prevented them from eating other snacks.

Table 2: Time of chewing gum (n=23)

| Early morning | Morning | Afternoon | 15:00 | Evening | Night |
|---------------|---------|-----------|-------|---------|-------|
| 2 | 6 | 6 | 2 | 4 | 3 |

Table 3: Questionnaire survey results after 30 days of chewing xylitol gum (n=23)

| | Yes | No |
|---|------------|------------|
| Could you chew the gum for 30 days? | 15 (65.2%) | 8 (34.8%) |
| Was it hard to chew gum everyday? | 13 (56.5%) | 10 (43.5%) |
| Did chewing gum change your appetite? | 3 (13.0%) | 20 (87.0%) |
| Do you think chewing gum has improved your chewing ability? | 6 (26.1%) | 17 (73.9%) |
| Do you think chewing gum helps improve saliva secretion? | 5 (21.7%) | 18 (78.3%) |
| Do you think chewing gum prevented your mouth from getting dry? | 8 (34.8%) | 15 (65.2%) |
| Do you think chewing gum reduce your dietary intake? | 2 (8.7%) | 21 (91.3%) |
| Do you think that chewing gum gives your jaw more strength? | 8 (34.8%) | 15 (65.2%) |
| Did chewing gum reduce your snack intake? | 6 (26.1%) | 17 (73.9%) |

IV. DISCUSSION

By adding chewing ability, it can be expected to promote jaw development and saliva secretion, and to promote digestive absorption. By chewing well, it may act on the satiety center and prevent overeating and overeating snacks. In the comments section of the female students who participated in this study, there were comments such as reduced intake of snacks, more chewing ability, and feeling better chewing. However, 15 out of 23 participants (65%) were able to chew gum daily for 30 days. Not everyone can chew gum daily when 13 participants (57%) answered that it was difficult to chew gum every day. There are many Japanese people who feel that even general gum is hard, so manufacturers sell soft gum to secure sales. As a result of this study, it said that it was difficult for female university students to chew gum every day, and their jaws became tired. However, on the other hand, chewing training using gum can be expected to be effective because some students felt that chewing ability was improved by chewing gum every day (26%). That saliva secretion was improved (22%). Since rice is the staple food of Japanese food, and it is a soft food, it may be one of the reasons for this result that there are few opportunities to chew hard food.

Educating about teeth has been reported to help sustain oral care^{1,2,3,4)}. In overseas reports, female brush their teeth better than male and even use dental floss^{5,6)}. It seems that many people brush their teeth in the morning and at night⁵⁾. There have been reports of measuring chewing power by various methods in past research. For example, device development and calculation models^{7,8,9,10)}. Because it has teeth, we can chew well, which gives better stimulation to our brain¹¹⁾. This stimulation is especially likely to prevent dementia in the elderly, and the results of chewing training using gum have been reported¹²⁾. We would like to enlighten people to increase the chances of developing chewing ability by increasing the chances of chewing hard food. We would like to encourage chewing training using the gum.

V. CONCLUSIONS

By chewing well, it works on the satiety center and prevents overeating. A better effect on jaw development and dentition can be expected due to its masticatory power. Twenty-three female university students chewed gum daily for 30 days and then asked them to complete a chewing ability questionnaire. As a result, 15 participants chewed gum daily, and 13

participants had difficulty chewing gum every day. Some participants noted in the comments that chewing gum every day was tired of their jaws, while others noted that they felt better saliva production and felt chewing. We would like to enlighten people to increase the chances of developing the chewing ability by increasing the chances of chewing hard food.

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2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

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Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

PREPARING YOUR MANUSCRIPT

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.



Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

- a) A title which should be relevant to the theme of the paper.
- b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
- c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
- d) An introduction, giving fundamental background objectives.
- e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
- f) Results which should be presented concisely by well-designed tables and figures.
- g) Suitable statistical data should also be given.
- h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

- i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
- j) There should be brief acknowledgments.
- k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.



FORMAT STRUCTURE

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.



Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

PREPARATION OF ELETRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

TIPS FOR WRITING A GOOD QUALITY MEDICAL RESEARCH PAPER

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.



6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.



20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium through which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.



The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."



Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

THE ADMINISTRATION RULES

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

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CRITERION FOR GRADING A RESEARCH PAPER (COMPILATION)
BY GLOBAL JOURNALS

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

| Topics | Grades | | |
|-------------------------------|--|---|---|
| | A-B | C-D | E-F |
| <i>Abstract</i> | Clear and concise with appropriate content, Correct format. 200 words or below | Unclear summary and no specific data, Incorrect form Above 200 words | No specific data with ambiguous information Above 250 words |
| <i>Introduction</i> | Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited | Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter | Out of place depth and content, hazy format |
| <i>Methods and Procedures</i> | Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads | Difficult to comprehend with embarrassed text, too much explanation but completed | Incorrect and unorganized structure with hazy meaning |
| <i>Result</i> | Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake | Complete and embarrassed text, difficult to comprehend | Irregular format with wrong facts and figures |
| <i>Discussion</i> | Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited | Wordy, unclear conclusion, spurious | Conclusion is not cited, unorganized, difficult to comprehend |
| <i>References</i> | Complete and correct format, well organized | Beside the point, Incomplete | Wrong format and structuring |



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