

Original Article

**Oral Condition and Health Status of Elderly 8020 Achievers
in Aichi Prefecture**

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Abstract

The purpose of this study was to investigate differences in oral condition and health status between persons with 20 or more teeth at the age of 80 (8020 elderly) and persons of the same age with less than 20 teeth (non-8020 elderly). This study was conducted by a team belonging to the Aichi Dental Association. Number of remaining teeth, Community Periodontal Index of Treatment Needs (CPITN), salivary blood test, masticatory ability, bone mineral density (BMD), grip strength, balance test (length of time one can stand on one leg with eyes open), height, weight and body mass index (BMI) were all examined. The percentages of CPITN code 0, 1 and 2 were 68% in the 8020 male elderly and 72% in the 8020 female elderly. The positive percentage in the salivary blood test in the 8020 elderly was lower than that in the non-8020 elderly. Masticatory ability was 1.55 g in the 8020 male elderly, and 1.53 g in the 8020 female elderly. Relative masticatory ability in the 8020 female elderly was 20% higher than that in the non-8020 female elderly. BMD in the 8020 female elderly was significantly higher than that in the non-8020 female elderly. Grip strength in the 8020 elderly was also significantly higher than that in the non-8020 elderly. The duration of balance test in the 8020 male elderly was 2.2 times longer than that in the non-8020 male elderly. The 8020 elderly showed good oral condition and health status was found to be better in the 8020 elderly than in the non-8020 elderly.

Key words: 8020—Oral condition—Health status

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Introduction

The average life expectancy for males in Japan was the second highest in the world in 2004, and the highest for females. The percentage of people aged 65 years or now exceeds 15%, and our society has become known as an “aging society”. Epidemiological surveys concerning the lifestyles of the elderly are being carried out in various locations throughout the country. Diet plays an important role in quality of life (QOL) for the elderly, and has a close relationship to oral function. However, the number of remaining teeth in the Japanese elderly aged 80 years was 8.3 according to a survey of dental diseases in 1999⁴⁾. The Ministry of Health, Labour and Welfare initiated a campaign for the elderly to retain at least 20 teeth until the age of 80 years (known as the 8020 movement¹¹⁾. The Aichi Dental Association has honored 2,960 achievers of the 8020 campaign every year since 1989. The purpose of this study was to investigate differences in oral condition and health status between 8020 and non-8020 elderly persons. This study was conducted by a team belonging to the Aichi Dental Association.

Methods

1. Participants

1) 8020 achievers

There were 217 participants (126 males and 91 females) with at least 20 teeth each (not including tooth roots only) at the age of 80 years or more. The average age was the same for both sexes, at 81.0 years for both males and females. They were honored as 8020 achievers by The Aichi Dental Association and lived in Nagoya city, Aichi Prefecture.

2) Non-8020 achievers

As a comparison to the 8020 achievers, 104 elderly persons aged 80 years or more (54 males and 50 females), living in Nagoya, and with less than 20 teeth, were also enrolled in this investigation. The average age was 81.8 years (males) and 81.4 years (females).

2. Methods of investigation

Our investigation comprised of an oral and a health examination.

1) Oral examination

(1) Teeth

Total number of remaining teeth (number of intact teeth, number of treated teeth, and number of untreated teeth) and number of missing teeth were determined.

(2) Community periodontal index of treatment needs (CPITN)

To assess periodontal condition, the World Health Organization CPITN¹⁾ was used.

(3) Salivary blood test

Occult blood in saliva was tested using Salivaster (Showa Pharmacy Inc. Japan)²⁷⁾, as a means to screen and evaluate periodontal patients. The reaction of the test comprised of double positive (++) , positive (+) , and negative (-) .

(4) Masticatory ability

A chewing gum method was adopted to objectively and easily evaluate the masticatory ability of the participants. After participants chewed 1 piece of gum (Lotte, Japan) 100 times at their preferred rhythm, the weight of the gum was measured against its original weight and the amount of sugar (g) released and absorbed was calculated²⁸⁾.

2) Health examination

(1) Bone mineral density (BMD)

Bone mineral density (g/cm²) was determined by a measurement at a specific point 1/3 along the radius from the wrist. The measurement was determined by dual energy X ray absorptiometry (DCS-600EX: ALOKA Inc. Japan).

(2) Grip strength

A dynamometer was used to determine the grip strength (kg) of both hands. Only the higher grip values were recorded.

(3) Balance test

To assess balance, the length of time (seconds) participants were able to balance on one leg with eyes open was measured.

(4) Body mass index (BMI)

To determine the obesity levels of the participants, BMI was calculated as the participant's weight (kg) divided by the square of

their height (m³).

3) Statistical analysis

Student's *t*-test was used to compare the mean values between the two groups. A *p* value of less than 0.05 was taken to be statistically significant.

Results

The distribution of the number of remaining teeth in the 8020 achievers is shown in Fig. 1. Seventy-six point one percent of males and 51.6% of females in the 8020 achievers had 24 remaining teeth or more. The number of intact teeth in the 8020 elderly was 9.8

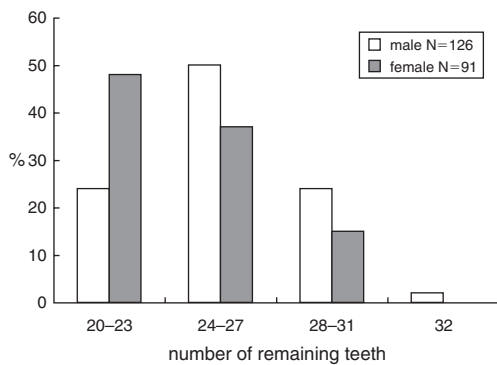


Fig. 1 Distribution of 8020 elderly according to total number of remaining teeth

in male and 9.9 in female. The number of treated teeth was 15.1 (males) and 14.3 (females), and the number of untreated teeth was 0.7 (males) and 0.5 (females).

The percentages of the 8020 elderly with CPITN code 0, 1 and 2 were 67.4% for males, and 72.5% for females. Among them, 19.0% males and 13.2% females achieved code 0, as shown in Fig. 2. The percentages of the 8020 elderly with code 4 were 4.0% for males and 4.3% for females. In the 8020 non-achievers, the percentages with code 0, 1 and 2 were 61.1% for males and 52.0% for females, and the percentages with code 4 were 11.1% in males and 6.0% in females.

The results of the 8020 achievers' salivary blood tests are shown in Fig. 3. The percentages of positive values in the salivary blood test in the 8020 elderly were 16.7% in males and 16.5% in females. However, the percentages of positive values in the salivary blood test in the non-8020 elderly were 44.4% in males and 30.0% in females.

The masticatory ability in the 8020 elderly was 1.55g in males and 1.53g in females. These values were higher than the values of the non-8020 elderly (1.44g in males and 1.27g in females).

The distribution of the average BMD in the 8020 elderly is shown in Fig. 4. BMD in the 8020 males was higher than that in the 8020 females, as shown in Tables 1 and 2. BMD in

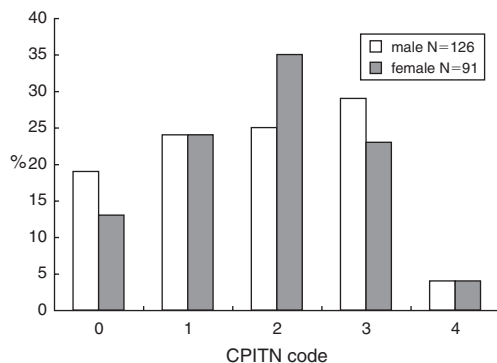


Fig. 2 Distribution of 8020 elderly according to CPITN code



Fig. 3 Distribution of 8020 elderly according to salivary blood test

the 8020 females was significantly higher than that in the non-8020 females, as shown in Table 2. However, BMD in the 8020 males was not significantly higher than that in the non-8020 males, as shown in Table 1.

Duration of balance in the 8020 males was

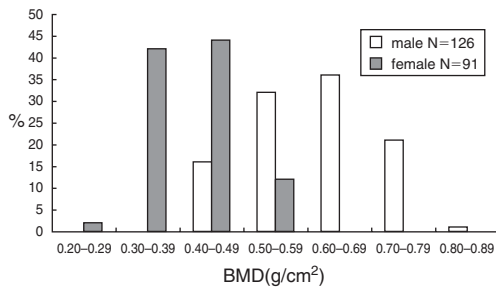


Fig. 4 Distribution of 8020 elderly according to bone mineral density (BMD)

30.7 sec, which was 2.2 times longer than that in the non-8020 males, as shown in Table 1. However, there was no significant difference in the duration of balance test between the 8020 and non-8020 females.

Average grip strength in the 8020 elderly was 28.4 kg in male, 17.9 kg in female, which was significantly higher than that in the non-8020 elderly, as shown in Tables 1 and 2.

In addition, average weight and average BMI in the 8020 females were significantly higher than that in the non-8020 females.

Discussion

At the beginning of this century, the Ministry of Health, Labour and Welfare launched a national health campaign known as “Healthy Japan 21”, in which targets for

Table 1 Mean value and standard deviation of physical condition in 8020 and non-8020 elderly (male)

	8020 elderly n = 126	non-8020 elderly n = 54
Bone mineral density (g/cm ²)	0.62 ± 0.1	0.61 ± 0.1
Grip strength (kg)	** 28.4 ± 4.3	24.9 ± 4.9
Balance test (sec.)	** 30.7 ± 43.1	13.7 ± 16.0
Height (cm)	158.8 ± 5.3	158.2 ± 5.7
Weight (kg)	55.9 ± 7.9	55.4 ± 8.1
Body mass index	22.2 ± 2.9	21.1 ± 3.0

1) Balance test shows length of time of standing on one leg with eyes open.

2) There were significant differences between 8020 elderly and non-8020 elderly by *t*-test. (**: $p < 0.01$)

Table 2 Mean value and standard deviation of physical condition in 8020 and non-8020 elderly (female)

	8020 elderly n = 91	non-8020 elderly n = 50
Bone mineral density (g/cm ²)	* 0.42 ± 0.1	0.39 ± 0.1
Grip strength (kg)	* 17.9 ± 3.3	16.7 ± 3.6
Balance test (sec.)	11.0 ± 13.5	9.5 ± 7.8
Height (cm)	145.5 ± 5.7	143.6 ± 6.4
Weight (kg)	* 48.6 ± 7.8	45.1 ± 7.1
Body mass index	* 22.9 ± 3.0	21.8 ± 2.7

1) Balance test shows length of time of standing on one leg with eyes open.

2) There were significant differences between 8020 elderly and non-8020 elderly by *t*-test. (*: $p < 0.05$)

dental health were set for the year 2010, aimed at realizing a longer and healthier life for the people. One of the goals was that the percentage of the elderly aged 80 years with 20 or more teeth should be increased from 11.5% to 20% or higher. Recently, in a Japanese society composed largely of elderly people, the 8020 movement has been spreading all over the country in Japan. However, the average number of remaining teeth in 80 year-old-people is 8.2, and the percentage with 20 or more teeth is 15.3% according to a national survey⁴⁾. In the epidemiological field, recently, many reports on the oral condition and health status of the elderly aged 80 years have been published to evaluate the meaning of the 8020 movement. According to the survey of 329 elderly honored by the Aichi Dental Association as 8020 achievers in 1992, there was a higher percentage of treated teeth and a lower percentage of untreated teeth. This was similar to the finding in this study that the number of untreated teeth of the 8020 elderly was very few: 0.7 in males and 0.5 in females, despite them having enough teeth. Besides decay, periodontal disease is one of the main causes of tooth loss, especially for the elderly¹⁹⁾.

Concerning masticatory ability, the 8020 elderly, especially females, demonstrated a high ability, which was similar to the ability of adults with 28 teeth in the report of Yano *et al.*²⁶⁾. Low masticatory ability was reported to have a significant correlation with low BMD⁵⁾, which leads to osteoporosis. Osteoporosis, especially in females, has become a major problem in the aging society. Osteoporosis is the second most common cause of bed-ridden conditions among the elderly, following the first instance of cerebral artery disturbances. In this study, BMD in 8020 females was significantly higher than that in non-8020 females. This finding would suggest there is a relationship between low BMD and number of lost teeth in the elderly^{6,7,8,13,20,24)}. It was also reported that there was a relationship between number of retained teeth and age-adjusted Stiffness²⁵⁾. Stiffness indicates BMD by ultrasound method.

Generally, grip strength is measured to determine muscle power. In this study, grip strength in the 8020 elderly was significantly higher than that in the non-8020 elderly. The grip strength in the 8020 elderly in this study was high compared to that in the healthy elderly who lived in Fukushima Prefecture¹⁸⁾. It was also reported that good masticatory ability had a positive effect on grip strength^{5,23)}.

It was suggested that length of time of standing on one leg was shorter for fallers than for non-fallers³⁾. In this study, duration of balance in 8020 males was 2.2 times longer than that in non-8020 males. In another study¹⁸⁾, duration of balance in 8020 males was 1.9 times longer than that in elderly persons with an average age of 80.3 years¹⁸⁾. It was also reported that elderly persons with good masticatory ability showed longer duration in the balance test^{17,23)}.

The Japan Obesity Association asserts that the BMI is the standard for judging obesity, and that a BMI of 22 is the average value, while a BMI of 26.4 was the actual value for obesity. In this study, BMI in the 8020 elderly was 22.2 in male, 22.9 in female, with only 5% of male and 13% of female 8020 elderly showing a BMI of 26.4 or more.

In addition to the oral condition and health status data shown in this study, such as those on CPITN, masticatory ability, BMD, grip strength, balance test and BMI, there have also been several other reports on 8020 achievers or the elderly aged 80 years.

Two reports showed that 8020 achievers were not fond of sweets around 20 or 40 years of age^{14,15)}. Other studies showed that 8020 achievers had relatively good occlusal and maxillofacial form^{12,13,16)}. It has also been found that a higher percentage of 8020 achievers were satisfied with life and felt healthy¹³⁾. There is a close relationship between number of teeth and heart rate¹⁰⁾. Masticatory ability is more important to QOL than number of retained teeth²⁾. Maintaining masticatory ability is important in maintaining daily life activities and social participation⁹⁾. Most 80 year-old elderly persons would recover their masticatory ability with the assistance of a

prosthesis²²⁾. A future goal is for the elderly aged 80 years to have 24 teeth or more²¹⁾.

Further investigation concerning oral condition and health status in the elderly is required in order to maintain a high quality of life in such people.

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