

Self-perceived Oral Health of the Elderly in a Rural Area, Japan

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Good oral health is considered essential in maintaining of individual's good overall health. Information on oral problems and the behavior in visiting dentist is important for promoting oral health of the elderly. To elucidate the oral health status of the elderly in rural areas and factors affecting their oral health, we studied 147 people aged 60 years or over in a rural area of Nagasaki prefecture, Japan. We examined the dental status (dentate or edentate) and denture adaptability, and collected the information on socio-demographic variables, habits, chewing ability, visit to dentist for oral problems, self-perceived general health, and self-perceived oral health. About one-third of the subjects (47/147) had poor self-perceived oral health. Most socio-demographic variables were not associated with poor self-perceived oral health. Logistic regression analysis showed that poor chewing ability (odds ratio (OR): 3.4; 95% confidence interval (CI): 1.4-8.7), being dentate (OR: 6.6, 95% CI: 2.2-24.0), inadequate denture adaptability (OR: 3.7; 95% CI: 1.7-8.8), and no visit to dentist for oral problems (OR: 4.8; 95% CI: 1.8-14.2) were significantly associated with poor self-perceived oral health. In rural areas in Japan, adequate dental care and its good accessibility would be important for promoting the oral health in the elderly.

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Introduction

Because of a rapid aging of the population, maintaining quality of life of the elderly has become of great concern in Japan. In 2000, *Healthy Japan 21*, a national plan for health promotion and disease prevention, was launched aiming for the achievement of longer healthy life expectancy and better quality of life.¹ Dental health is listed as one of the nine target issues. Good dental health is considered essential in maintaining individual's good overall health.

Traditionally, dentists have assessed the treatment outcomes with objective clinical indicators, but in recent years, patient's self-perception of oral health based on the impact of oral conditions on the quality of life, satisfaction and efficacy of the dental services is taken into account.² The self-perception of oral health is important for screening individuals who need dental treatment.³ The importance of subjective indicators of oral health, e.g. self-perceived oral health, is increasing.

The perception of oral health has been reported to be associated

with socio-demographic factors such as education level, economic situation and social class.^{4,7} Dental status and chewing problems are also reported to be related to self-perceived oral health.⁸⁻¹¹ Oral health problems affect eating, facial expression, daily activity and social activity,¹² and are also associated with sleep deprivation, depression and various adverse psychosocial outcomes.¹³ Thus, oral health is recognized today as one of the integral determinants of overall health and social well-being.¹⁴

Although economic growth of Japan has improved public and medical services,⁹ discrepancies still exist between urban and rural areas regarding the oral health status in the elderly.¹⁵ A national survey revealed that the proportion of the elderly with untreated decay was 7% and 12% in urban and rural areas, respectively.¹⁶ Poor oral health status among the elderly in rural areas may probably be resulted from a lack of dental care services and difficulty in accessing the services.¹⁵

Information on oral problems and the behavior in visiting dentist is therefore important for promoting oral health of the elderly liv-

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ing in rural areas. The objective of the present study was to assess the self-perceived oral health of the elderly living in rural areas in Nagasaki prefecture, Japan, and to elucidate its association with the socio-demographics, habits, subjective and objective oral factors, and self-perceived general health.

Subjects and Methods

The subjects were 217 residents of Oseto-cho of Saikai city, Nagasaki prefecture, Japan, who were aged 60 years or over and participated in the present study. Oseto-cho lies approximately 40 km northwest of Nagasaki city, consisting of 4 rural districts: Taira, Seto, Matsushima and Yukino-ura. The 2000 Census population was approximately 8,000,¹⁷ and those aged 65 years or over amounted to 28% of the population. The subjects were all living in Matsushima and Yukino-ura, where no dentist is yet available. Residents of these two districts have to travel about 3-10 km across the sea or the mountain to visit the nearest dental clinic (Figure 1). The population of those aged 60 years or over in Matsushima and Yukino-ura as of March 1, 2006 was 337 and 623, respectively.

We obtained the list of senior citizens' clubs from Saikai City Hall, and asked the leader of each club for encouraging the members to participate in the study. Three dentists of Nagasaki University carried out dental examination and interview at each community center in August and September 2005. Dental examinations included dental status (i.e. dentate or edentate) and denture adaptability. The subjects were requested to respond to the questions on socio-demographic variables, habits, chewing ability, visit to dentist for oral problems, and their self-perceived general health. The self-perceived oral health

was measured by the question "How do you assess the condition of your mouth?" with three choices for response (good, fair and poor). All subjects gave written informed consent before examination. This study was approved by the Ethics Committee of Nagasaki University Graduate School of Biomedical Sciences.

Data analysis

We excluded from the analysis the subjects with incomplete response to the questions, and 147 subjects (96 in Matsushima and 51 in Yukino-ura) remained. We treated all variables as discrete by

Table 1. Characteristics of the 147 study subjects

Characteristics	Number	Percentage ^a
Age (year)		
60-69	37	25.2
70-79	83	56.5
80-	27	18.4
Sex		
Female	95	64.6
Male	52	35.4
Number of family		
1	29	19.7
2	64	43.5
3 or more	54	36.7
Length of education		
6 years or less	14	9.5
Over 6 years	133	90.5
Satisfaction with economic situation		
Satisfied	43	29.2
Not satisfied or fair	104	70.8
Smoking		
Never smoke	113	76.9
Ceased smoking	21	14.3
Smoke	13	8.8
Alcohol drinking		
Never drink	85	57.8
Drink sometimes	32	21.8
Drink	30	20.4
Chewing ability		
Any food	103	70.1
Soft food only or unable	44	29.9
Dental status		
Dentate	101	68.7
Edentate	46	31.3
Denture adaptability		
Adequate	91	61.9
Inadequate	56	38.1
Visit to dentist for oral problems		
Yes	113	76.9
No	34	23.1
Self-perceived general health		
Good or fair	113	76.9
Poor	34	23.1

^aProportion of subjects in each category for respective characteristics.

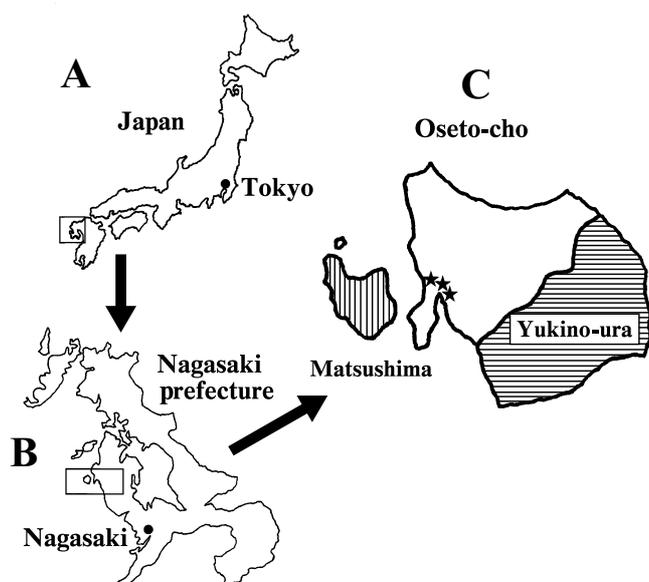


Figure 1. Three maps indicating the location of the study areas. **A.** Location of Nagasaki prefecture in Japan. **B.** Location of Saikai city in Nagasaki prefecture. **C.** Location of the study areas (Matsushima and Yukino-ura) in Oseto-cho of Saikai city; each star indicates the location of a dental clinic.

classifying continuous variables into 3 categories (age) or 2 categories (length of education), and evaluated the association between self-perceived oral health and each variable; we dichotomized the self-perceived oral health by combining "good" and "fair", and calculated odds ratios (ORs) and 95% confidence intervals (95% CIs). Correlation between two variables was tested by Fisher's exact test or chi-square test according as the number of categories of both variables is 2 or not. The simultaneous effects of variables on the self-perceived oral health were analyzed using linear logistic regression

model. Starting with a full model including all variables, we selected the most appropriate model on the basis of Akaike's Information Criterion (AIC). Once the most appropriate model was selected, the maximum likelihood estimation of the model parameters was carried out and then the odds ratio and its 95% confidence interval were calculated for each variable in the model. Likelihood ratio statistics were used for the calculation of the confidence intervals. **FREQ** and **LOGISTIC** in the SAS® system version 8.2 (SAS Institute Inc. Cary, NC) were used for the calculations.

Table 2. Classification of subjects by characteristics and self-perceived oral health status

Characteristics	Self-perceived oral health			
	Good or fair (n=100)	Poor (n=47)	OR ^a	95% CI ^b
Age (years)				
60-69	23	14	1	
70-79	61	22	0.6	0.3-1.4
80-	16	11	1.1	0.4-3.1
Sex				
Female	67	28	1	
Male	33	19	1.4	0.7-2.8
Number of family				
1	24	5	1	
2	40	24	2.8	1.0-8.6
3 or more	36	18	2.4	0.8-7.3
Length of education				
6 years or less	10	4	1	
Over 6 years	90	43	0.8	0.2-2.8
Satisfaction with economic situation				
Satisfied	74	30	1	
Not satisfied or fair	26	17	0.6	0.3-1.3
Smoking				
Never smoke	75	38	1	
Ceased smoking	15	6	0.8	0.3-2.2
Smoke	10	3	0.6	0.2-2.3
Alcohol				
Never drink	58	27	1	
Drink sometimes	24	8	0.7	0.3-1.8
Drink	18	12	1.4	0.6-3.4
Chewing ability				
Any food	77	26	1	
Soft food only or unable	23	21	2.7	1.3-5.7
Dental status				
Dentate	64	37	1	
Edentate	36	10	0.5	0.2-1.1
Denture adaptability				
Adequate	71	20	1	
Inadequate	29	27	3.3	1.6-6.8
Visit to dentist for oral problems				
Yes	83	30	1	
No	17	17	2.8	1.3-6.1
Self-perceived general health				
Good or fair	83	30	1	
Poor	17	17	2.8	1.3-6.1

^aOR=Odds ratio. We set the value at 1 for the reference group.

^bCI=Confidence interval.

Table 3. Estimates and confidence interval of odds ratio for variables associated with poor self-perceived oral health

Variable	Comparison	OR ^a	95% CI ^b
Chewing ability	Poor vs good ^c	3.4	1.4-8.7
Dental status	Dentate vs edentate	6.6	2.2-24.0
Denture adaptability	Inadequate vs adequate	3.7	1.7-8.8
Visit to dentist for oral problems	No vs yes	4.8	1.8-14.2
Self-perceived general health	Poor vs good ^d	2.1	0.8-5.6

^aOR=Odds ratio estimate.

^bCI=Confidence interval.

^cPoor=Able to chew soft food only or unable to chew any food; Good=Able to chew any food.

^dGood=Good or fair.

Results

The characteristics of the subjects are summarized in Table 1. The age of the subjects ranged from 60 to 87 years with the mean (standard deviation) of 74.1 (6.3) years and no significant difference was observed between females and males ($p=0.95$). There was no significant difference by economic situation in the proportion of subjects who visit dentist for oral problems ($p=0.4$). The proportion of subjects who could chew only soft food or could not chew any food was higher in edentate subjects (41.3%) than in dentate subjects (24.8%), but the difference was slightly not significant between the two groups ($p=0.053$). The variables showing a significant correlation with the self-perceived general health were sex ($p=0.043$), alcohol drinking ($p=0.037$), chewing ability ($p=0.001$), dental status ($p=0.034$) and visit to dentist for oral problems ($p=0.022$). The proportion of subjects with good or fair self-perceived general health was higher: in males (86.5%) than in females (71.6%); in those who drink (90.0%) than in those who do not drink (69.4%) or who ceased drinking (84.4%); in those who could chew any food (84.5%) than in those who could chew only soft food or could not chew any food (59.1%); in the dentate (82.2%) than in the edentate (65.2%); and in those who visit dentist for oral problems (81.4%) than in those who do not (61.8%).

A total of 47 subjects considered their oral health poor. The association of the respective variables with the prevalence of poor self-perceived oral health is presented by odds ratio with the 95% confidence interval in Table 2. The variables showing a significant association with the prevalence of poor self-perceived oral health were chewing ability, dental status, denture adaptability, visit to dentist for oral problems and self-perceived general health; dental status was marginally significantly associated with the prevalence of poor self-perceived oral health ($p=0.09$).

Among 12 variables presented in Table 2, the following 5 variables were included in the most appropriate linear logistic regression model describing the prevalence of poor self-perceived oral health: chewing ability, dental status, denture adaptability, visit to dentist for oral problems, and self-perceived general health; Table 3 presents the estimate and the 95% confidence interval of the odds ratio

for each of these variables. The findings presented in Table 3 indicate, for example, that the risk of poor self-perceived oral health will be higher by approximately 3.4-fold in those who can chew any food than in those who can chew soft food only or nothing if they are similar with respect to other variables.

Discussion

The present study showed that chewing ability, dental status, denture adaptability, and visit to dentist for oral problems were significantly associated with self-perceived oral health. Our study provides us with some insight into how the elderly in rural area perceive their oral health condition. It is important to take their perception of oral health situation into account.¹⁸ When people have oral problems, they may perceive a need for dental care. Uncomfortable eating, broken filling, broken denture, cavities, lost tooth, teeth that look bad, and toothache were reported to be associated with poor self-perceived oral health.¹⁹⁻²¹

In this study, subjects with poor chewing ability perceived their oral health to be poor. Locker and Miller²² reported that poor chewing ability was associated with negative oral self-perception. Gilbert et al.²³ showed that dissatisfaction with chewing ability was related to oral tissue damage, oral functional limitation and oral disadvantage. The elderly with inadequate dentures or few teeth might be able to chew soft food only or unable to chew any food. Furthermore, low perceived salivary flow was reported to be associated with poor chewing ability.²⁴ Thus, chewing ability is one of the principal functions of oral cavity. As chewing ability declines, people may choose soft foods, and this can lead to marked changes in intake of dietary fiber and other nutrients.

Having teeth would be important for chewing ability. In the present study, however, dentate subjects were more likely to report self-perceived oral health to be poor, compared with edentate subjects. If subjects adapt to edentulous situation and can eat anything they want, they might be satisfied with their oral condition. On the other hand, if dentate subjects have some dental problems, they might not be satisfied with their oral condition. These findings

suggest that dentate subjects in this study were less likely to be treated, probably due to poor accessibility to dental care services.

Ikebe et al.⁹ reported that, in Osaka, Japan, those with denture were six times more likely to report poor oral health than those with natural dentition. A previous study showed that denture status was associated with oral problems and was a strong predictor of self-perceived oral health.²⁵ In our study, denture adaptability was found to be one of the significant predictors of self-perceived oral health. Inadequate denture adaptability produces symptoms or discomfort in the elderly.²⁶ Furthermore, inadequate denture adaptability could cause poor chewing ability. In order to promote the oral health of the elderly, inadequate dentures need to be repaired or replaced with adequate new ones.

We showed that no visit to dentist for oral problems was associated with poor self-perceived oral health. Such no visit is probably due to lack of dental care services or difficulty in access to the services in rural areas. Limited or no access to dental health services may be a barrier to visit dentist, especially for the elderly. In our study site (Oseto-cho), three dentists treat residents, but the area where the study subjects were living was approximately 3-10 km distant from the dental clinics. For the elderly without the means of transportation or with physical disability, the distance would be the barrier for access to dental services. Thus, public health strategy should be given to decrease the difference in accessibility to health services between urban and rural areas, especially for the elderly.

Several studies reported that self-rated general health was related to self-rated oral health.^{27,28} Furthermore, a greater proportion of individuals who rated their general health to be fair or poor reported poor chewing ability.¹⁰ A recent study in Japan showed that maintenance or recovery of sufficient chewing ability in the elderly is related to a longer total life expectancy and even more strongly to a longer active life expectancy.²⁹ In our study, the univariate analysis also indicated a significant association between self-perceived general health and self-perceived oral health. The multivariate analysis, however, though included self-perceived general health in the final model, did not show a significant association between the two variables. Such a discrepancy observed in the present study may be interpreted by that self-perceived general health was significantly correlated with the variables significantly associated with self-perceived oral health, i.e. chewing ability, dental status and visit to dentist for oral problems. The findings of the present study thus suggest the importance of chewing ability for both general and oral health.

Health insurance could influence the people's behavior in visit to physician or dentist. In developing countries, it is reported that people desire dental care only for symptomatic problems,^{30,31} and that they treat by themselves using medicinal plant or buying over-the-counter medicines at the pharmacy. In Canada, the older adults who have dental insurance visit dentist more frequently than those who do not.³² On the other hand, Japan has a national health insurance system for all citizens that covers medical and dental care. In the present study, no visit to dentist for oral problems was significantly associated with poor self-perceived oral health; however no significant

association was observed in the present study between visit to dentist for oral problems and economic situation. Since any people with oral problems could be treated irrespective of their economic situation in Japan, the difference in the behavior in visit to dentist may result from difference in accessibility to dental care services.

Our results showed that poor chewing ability, being dentate, inadequate denture adaptability, and no visit to dentist for oral problems were significantly associated with poor self-perceived oral health. In rural areas in Japan, adequate dental care and its good accessibility would be important for promoting the oral health in the elderly. We recommend development of various dental health educational programs and improvement of accessibility to dental services suitable for the elderly of rural areas in Japan.

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