Insomnia and depression impair oral-health related quality of life in the old-old

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Running head: GOHAI and mental health in the old-old

Abstract

Aim: A previous study reported that the oral health-related quality of life (OHRQoL) of Japanese individuals dropped sharply as they entered old-old age. The aim of present study was to explore the risk factors of OHRQoL by investigating the association of OHRQoL with oral indices, lifestyle, and psychological distress. METHODS: A questionnaire survey was conducted to assess the OHRQoL, oral indices, lifestyle, and psychological distress of patients who were of ≥75 years of age and who regularly visited a dental clinic for maintenance. OHRQoL and psychological distress were assessed using the General Oral Health Assessment Index (GOHAI) and the General Health Questionnaire (GHQ), respectively. The relationships between the GOHAI score and related factors were examined by nonparametric bivariate and logistic regression analyses using a GOHAI cut-off score of 45.0. RESULTS: A total of 187 old-old patients with a mean age of 77.9±3.0 years participated in this study. The average GOHAI score was 50.8±8.0. In the bivariate analyses, the average sleeping hours, use of sleep medication, SF-8, GHQ score, and the number of teeth present were significantly correlated with the GOHAI

score. A logistic regression analysis revealed that the number of teeth present, GHQ, and the use of sleep medication were associated with the GOHAI score.

CONCLUSIONS: This study found that the OHRQoL was strongly associated with insomnia and depression. It is therefore suggested that oral health care professionals take general background information, such as the presence of insomnia and depression, into consideration to improve OHRQoL when they treat old-old patients.

Key words

depression, insomnia, old-old, oral-health related quality of life.

Introduction

The society of Japan is aging dramatically. In 2014, the aging rate reached 26.0% and the percentage of the population that was ≥75 years of age reached 12.5%[1,2]; the figure is expected to reach 26.9% in 2060. This problem also exists in other developed countries[1].

In many cases, older adults want to continue to live in their house and in the community where they have resided for a long time, even in the presence of disease or disability; their families often hope for the same[1]. Older people age gracefully, live a fruitful life and die a natural death[1].

Older people not only look for a longer duration of life but also a better quality of life (QOL). Physical and mental health-related problems are associated with QOL. Therefore, it is very important to understand the factors that influence health to improve the QOL older adults[3].

The World Health Organization reported that oral health is an important part of well-being, and that oral health-related quality of life (OHRQoL) is significantly associated with general quality of life, especially in older adults[4-7].

One of the most commonly used measures of OHRQoL is the Geriatric Oral Health Assessment Index (GOHAI), which was developed specifically for use with older adults[8,9].

Previous studies regarding the GOHAI in older adults have reported that the GOHAI was strongly related to their oral health status[8-12]; some studies have reported an association between the GOHAI and factors that reflect socioeconomic status, including household income and education level[13]. Recently, Fabiolá reported that the GOHAI was associated with depression[10]. In 2006, a nationwide study on the association between age and the GOHAI was performed in Japan, it revealed that the GOHAI score dropped sharply in subjects who were in their 70s[14].

The aim of the present study is to explore the risk factors for a decline in OHRQoL by investigating the association of the GOHAI with dental indices, lifestyle, and depression in the old-old.

Materials and Methods

Subjects

A total of 4,317 consecutive patients who were over 40 years of age and who were treated at 26 private dental offices in Japan were

invited to participate in the present study during the period from August 2006 to October 2006. The exclusion criteria were as follows: patients who were not able to answer the questionnaire by themselves or who were not able to answer questions in an interview, patients who did not need a periodontal examination (or who refused to undergo a periodontal examination), and patients who were only admitted for emergency treatment. For the analysis, we selected the patients who were ≥75 years of age. The protocol of the present study was reviewed and approved by the Ethics Committee of Fukuoka Dental College (Approval No. 93). All of the participants involved in this study provided informed consent.

Data on the health and lifestyle of the subjects were collected by a self-completed questionnaire at the dental office. The Japanese version of the SF-8, the Medical Outcome Study short form of the health-related quality of life (HRQoL) scale SF-36, was used to measure general HRQoL[15].

The General Health Questionnaire (GHQ) is a self-administered screening instrument used to assess psychological morbidity. The four answer choices for each of the GHQ items were assigned with scores of 0 or 1. The responses, “Not at all” and “About usual”

were assigned a score of 0, while “more than usual” and “always” were assigned a score of 1. Psychopathology was represented by the total score of all 12 questions[16, 17].

The Japanese version of the GOHAI, was used to assess the OHRQoL. The GOHAI is a 12-item index which assesses three dimensions of oral health: 1) physical functions, including eating, speech and swallowing; 2) psychosocial functions, including worries or concerns about oral health, self-image, self-consciousness about oral health and avoidance of social contact because of oral problems; and 3) pain or discomfort[8]. The total scores range from 12 to 60. Higher values represent a better OHRQoL[8, 15].

Other data collected from the questionnaire included age, gender, self-reported oral-health procedures, dental visits, height and weight, systolic and diastolic blood pressure, and the patient’s medical regimen.

The oral health-related data were collected by a review of the dental treatment records after obtaining written consent from the participants. These records were reviewed for the same time period as the questionnaire survey. The collected data included the

number of teeth present, the number of sites with a probing depth of 4-6 mm, and the number of sites with a probing depth of more than 6 mm, the severity of alveolar bone resorption, the treatment stage, the number of dental visits, and the interval between dental visits.

Raw data from the paper questionnaires and the reviews of the subjects' dental treatment records were entered into a computer database. The raw SF-8 and GOHAI data scores were transformed into scores that could be utilized in a statistical analysis using guidelines that were provided by the authors of both of the scales. Continuous variables are presented as the means with standard deviations, and categorical data are presented as numbers and percentages.

Depression symptoms were assessed by the GHQ. Because GHQ has been shown to have a similar accuracy to the Geriatric Depression Scale (GDS) for identifying depression in the elderly[18, 19]. We therefore used a cut-off GHQ score of ≥5 points to define major depression.

The first quartile of the GOHAI score was 45.3 according to the national norm for Japanese individuals of 70 to 79 years of age[14].

As a result, we used a cut-off score of 45 points to define a GOHAI score of ≤45 as the GOHAI-low group and a score of ≥46 points as the GOHAI-high group.

Statistical Analysis

The differences in the variables of the GOHAI-low and GOHAI-high groups were evaluated using the chi-squared test and the Mann-Whitney U test. Logistic regression models were used to identify the risk factors of the GOHAI-low group. Stepwise regression was performed with levels for entry and exclusion set at p= 0.05 and based on the likelihood ratio statistic. Analyses were performed using the SPSS software program (version 21.0, IBM Japan, Tokyo).

Results

Study participants

A flow chart illustrating the selection of the study participants is shown in Figure 1. Of the 4,317 patients who were invited to participate in this study, 3,378 patients (78.2%) gave informed consent. The 3,378 participants who indicated that they were

willing to participate signed a consent form and were requested to answer the questionnaire. The 224 participants who were of ≥75 years of age were selected for the present analysis. A total of 37 participants were excluded due to missing values. Finally, 187 subjects were selected for the present analysis.

Table 1 shows the basic characteristics of the participants in the GOHAI-low and GOHAI-high groups. The mean age of the participants was 77.9±3.0 years. The mean total GOHAI score was 50.8±8.0. There were no statistically significant differences between the two groups with regard to the age or gender.

The GOHAI score was correlated with average sleeping hours, the use of sleep medication, the SF-8 score, the GHQ score, the number of teeth present, the number of filled teeth, and period of maintenance in the clinic (maintenance period).

According to the results of the logistic regression analysis, the use of sleep medication and depression were significant factors in the GOHAI-low group. Meanwhile, the number of teeth present and maintenance period were significant factors in the GOHAI-high group (Table 2). The odds ratio for number of teeth present was 0.90 (95% confidence interval [CI]: 0.86 to 0.95), while that for

the maintenance period was 0.87 (95% CI: 0.79-0.97). The odds ratios for the use of sleep medication and depression were 3.51 (95% CI: 1.21-8.23) and 3.37 (95% CI: 1.19-9.25), respectively. The Hosmer-Lemshow test value of this model was p=0.637, while the identification rate was 81.8%.

Discussion

According to the logistic regression analysis, maintenance years, the number of teeth present, depression, and the use of sleep medication were independently associated with the GOHAI score.

Some previous studies have reported the GOHAI score to be associated with the number of teeth present.[8-12, 19]. This may be because tooth loss impairs the chewing function and aesthetic satisfaction.

The present study showed that there was an association between maintenance years and GOHAI. Few studies have investigated this association. Mehrstedt et al. reported that oral anxiety impaired the OHRQoL[20]. It is therefore suggested that a long period of dental maintenance builds a trusted relationship between oral healthcare professionals and old-old patients. This relationship

may contribute to the improvement of their OHRQoL.

The present study showed that depression was strongly associated with GOHAI. Older adults with depression are significantly more likely to have poor GOHAI scores[10]. Sugahara et al. reported that somatic symptoms such as sleep disturbance, loss of appetite, general fatigue, loss of interest, and agitation are prominent characteristics in patients with depression[21]. Forsell et al. reported that motivation-related symptoms were more prevalent in the older adults[22]. These symptoms may impair GOHAI.

Furthermore, psychological well-being was associated with oral symptoms, including dry mouth, bleeding gums, painful teeth, difficulty in chewing, and oral malodor[11, 23]. Depression therefore impaired their oral conditions and their GOHAI score. Meanwhile, the use of antidepressants may lead to a decrease of saliva[24], thereby causing the symptom of dry mouth, which may impair their OHRQoL.[23] However, we did not investigate the participants' use of antidepressants in the present study. The rate of depression among the old-old is higher than that among the young-old [25]. It has previously been reported that depression constituted a risk factor for mortality in older adults[19], and there was a significant

relationship between depression and the ability to perform activities of daily living in the old-old.[25]. It is suggested that depression may be one of the main risk factors for a diminished OHRQoL in the old-old.

Interestingly, the present study showed that use of sleep medication was strongly associated with the GOHAI. Insomnia increases in older adults due to their higher rate of physical and mental disorders and the deterioration of sleep with aging[26]. In Japan, the main drug used for the treatment of insomnia is benzodiazepine (BZ). The use of BZ decreases salivary flow and causes xerostomia[24]. These effects might impair the OHRQoL[19].

A limitation of the present study is the fact that the study population was not population-based; rather, it included healthy people who were able to attend a dental clinic by themselves and fill in the self-reported questionnaires and who showed no cognitive function impairment. Community-based studies are therefore needed to generalize these findings.

This study revealed that insomnia and depression were main causes of impaired OHRQoL. It is suggested that oral-health care professionals should take general background characteristics, such

as the presence of insomnia and depression into consideration to improve OHRQoL when they treat the old-old.

Disclosure Statement

The authors declare no conflict of interest.

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Figure legends

Figure 1: A flow chart illustrating the selection of the study subjects

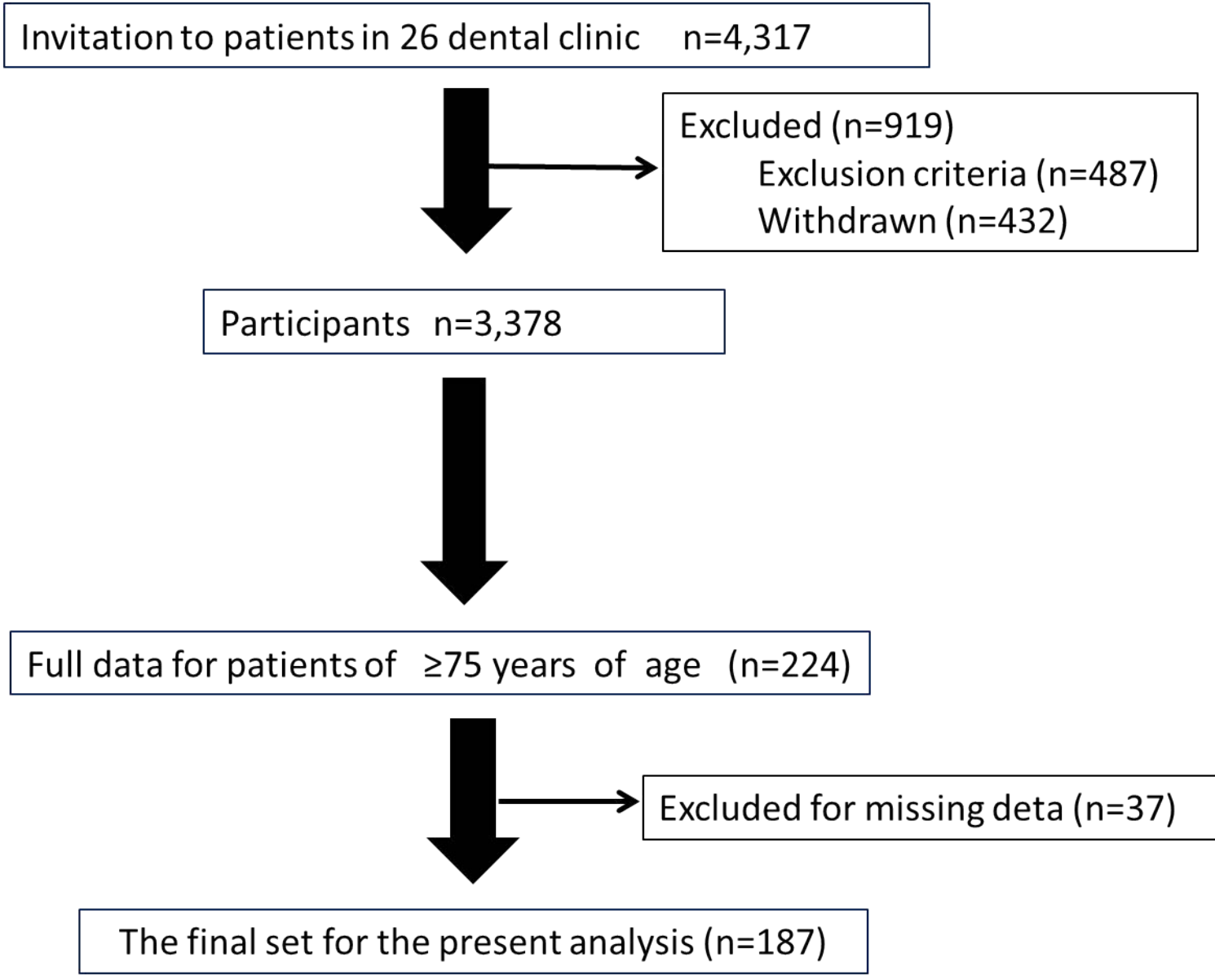
Invitation to patients in 26 dental clinic n=4,317
Excluded (n=919)
Exclusion criteria (n=487)
Withdrawn (n=432)
Participants n=3,378
Full data for patients of ≥75 years of age (n=224)
Excluded for missing deta (n=37)
The final set for the present analysis (n=187)

Table 1. The characteristics of the study subjects

	GOHAI-low group (n=43)	GOHAI-high group (n=144)	Total (n=187)	*p* -value
Gender（Male/Female）	19/24	68/76	87/100	0.431†
Age	77.9±3.0	77.8±3.0	77.9±3.0	0.820
BMI	22.2±3.4	22.5±3.3	22.4±3.3	0.726
Average sleeping hours (/day)				<0.001†
≤5 hours	8	6	14	
6 hours	9	45	54	
7 hours	15	42	57	
8 hours	7	35	42	
9 hours	3	12	15	
≥10hours	1	4	5	
Sleep medication (yes)	14	14	28	<0.001†
Antihypertensive (yes)	22	74	96	0.979
Anti -cholesterol drug (yes)	10	31	41	0.810
Oral antidiabetic (yes)	4	8	12	0.286
Antilipidemic agents (yes)	3	8	11	0.484
GOHAI	38.5±5.6	54.5±3.9	50.8±8.0	<0.001

SF-8				
SF-8 physical summary score	43.9±6.4	46.5±6.4	45.9±6.6	0.026
SF-8 mental summary score	47.5±8.1	50.7±6.5	50±6.6	0.001
GHQ score	3.0±3.0	1.5±2.3	1.8±2.6	<0.001
Number of teeth present	13.4±8.2	18.9±7.2	17.6±7.7	<0.001
Number of filled teeth	8.3±5.4	12.0±5.7	11.2±5.8	<0.001
Number of decayed teeth	1.1±2.3	1.1±3.3	1.1±3.1	0.187
Prevalence of pocket depth				
4-6 mm	35	107	142	0.340†
≥7 mm	18	39	57	0.065†
Tooth brushing (/day)				0.328†
Less than once	1	1	2	
Once	7	26	33	
Twice	20	67	87	
Three times	10	44	54	
More than three times	5	6	11	
Period of maintenance (years)	2.8±4.3	5.0±4.4	4.5±4.5	0.001
Smoking status				0.551
Non-smoker	32	108	140	
Past-smoker	8	28	36	

Current-smoker	3	8	11

†Chi-square test

Mann-Whitney *U* test

Table 2. Logistic regression of the predictors of the GOHAI score

	B	Odds ratio	(95% CI†)	*p*-value
Gender	0.049	1.05	(0.48-2.30)	0.902
Age	-0.033	0.97	(0.84-1.10)	0.637
Number of teeth present	-0.101	0.90	(0.86-0.95)	<0.001
Period of maintenance	-0.138	0.87	(0.79-0.97)	0.008
Sleep medication	1.149	3.51	(1.21-8.23)	0.019
Depression	1.215	3.37	(1.19-9.25)	0.022

Model: chi square test $p<0.001$, †CI :confidence interval