Relationship Between Oral Health, Quality of Life, and Comprehensive Health Literacy in Community-Dwelling Older Adults

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Background and purpose: Oral health affects systemic health and the importance of maintaining good oral health is acknowledged. The high prevalence of oral diseases is associated with low health literacy (HL). Therefore, the purpose of this study was to investigate whether comprehensive HL in community-dwelling older adults is associated with objective oral hygiene and oral health-related quality of life (OHRQoL). **Methods:** Participants aged ≥65 years

completed a self-administered questionnaire. On the same day, data collected with the Oral Health Assessment Tool were used to assess participants' objective oral status. The questionnaire included the General Oral Health Assessment Index to measure OHRQoL and the short version of the European Health Literacy Survey Questionnaire to assess comprehensive HL. Data were analyzed by univariate and multiple logistic regression. **Results:** In total, 145 people consented to participate in this study, of whom 118 (81.4%) responded effectively. Of the 118 participants, 18% recorded a rating of "unhealthy" for oral cleanliness in objective oral hygiene. Multiple logistic regression analysis identified comprehensive HL as a related factor for both oral cleanliness and OHRQoL (odds ratio = 5.00 and 3.33, $p < 0.01$ and $p < 0.05$, respectively). **Implications for Practice:** These findings indicate that comprehensive HL changes clinical outcomes. Because older adults often have comorbidities as well as oral health problems, it is important for nurses to assess HL during follow-up for comorbidities and take the opportunity to provide personalized oral health guidance and improve OHRQoL.

The world's population continues to age, particularly in Japan, where it is estimated that by 2025, the number of people aged 75 and over will exceed 20 million (Iijima et al., 2021). Japan has one of the best dental service supply systems in the world (OECD Stat Health Care Resources, 2017), with a national-level survey indicating that regional inequality in dental care utilization is small (Taira et al., 2021). The deterioration of oral health in older adults not only impairs physical health due to oral symptoms and poor chewing ability but also worsens an individual's psychological state and social relationships due to pain and restricted conversation (van de Rijt et al., 2020) and limits their quality of life (QoL; Shao et al., 2018). A systematic review of oral health focusing on the systemic effects of periodontal disease treatment on diabetes, cardiovascular disease, and obesity emphasized the importance of maintaining good oral health (Taylor et al., 2021). As professionals experienced with the daily management of convoluted healthcare services, nurses may be well-suited for helping them implement and evaluate primary care interventions tailored for increasingly comorbid older adults (Corser, 2011).

As an assessment tool for oral health, a rating scale exists that measures objective oral hygiene and subjective oral health-related quality of life (OHRQoL) (Thapa et al., 2021). The Oral Health Assessment Tool (OHAT), developed by Chalmers et al. (2005) as an objective rating scale of oral hygiene, can be appraised not only by oral specialists but also by other professionals and is a simple and reliable tool for observing the oral cavity and assessing health using a check sheet (Thapa et al., 2021). The use of OHAT by nurses will enable the oral assessment of older people receiving home care (Everaars et al., 2020) and facilitate smooth collaborations with dental professionals in the prevention of oral disease.

Patients with low health literacy (HL) have been shown to have a high prevalence of oral diseases, such as dental caries and periodontal disease, in terms of the factors related to objective oral condition (Firmino et al., 2017), thereby bringing attention to HL. HL is defined as "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health" (Nutbeam, 1998). A study targeting children and adults found that the higher the HL score, the better the objective oral hygiene (Firmino et al., 2017; Hjertstedt et al., 2014), while a study targeting older adults indicated that the higher the HL score, the better was the subjective oral hygiene and OHRQoL (Kwon et al., 2021; Macek et al., 2016). However, these HL scale measurements are limited to the comprehension of oral health information (Bado et al., 2020), along with basic communication skills such as reading or communicating health information (Divaris et al., 2011). In recent years, however, the concept has expanded to include HL involving the simultaneous use of a more complex and interrelated set of competencies, such as reading and acting on written health information, communicating health needs to healthcare professionals, and understanding health instructions (Peerson & Saunders, 2009).

Therefore, with Japan's high literacy rate, it is important to focus on HL in the broad sense of evaluating health information to make decisions rather than HL (Tavousi et al., 2022), which focuses on oral health mainly in terms of dental knowledge and numerical reading skills. Sørensen et al. (2012) identified the original broad conceptual framework of HL, expanding the concept to include information seeking, decision making, problem solving, critical thinking, and communication, and then developed a comprehensive HL scale (Nakayama et al., 2015; Sørensen et al., 2012) to encourage health promotion and its use for disease prevention in a wider range of targets. This comprehensive HL scale assesses the difficulty in addressing an individual's health challenges and is unique in that it also considers the circumstances surrounding the individual whose health challenges are being resolved (Sørensen et al., 2015). Therefore, using this scale makes it possible to measure not only the ability of an individual but also the surrounding support and environment sustaining that individual. Improvements in such comprehensive HL have brought about improved health behavior and quality of life among patients suffering from heart failure and kidney disease (Jovanić et al., 2018; Kita et al., 2021), including a reported decrease in the utilization of medical services (Vandenbosch et al., 2016).

Home care is expected to extend the role of nurses in the community beyond traditional roles to maintain oral health, thereby meeting the growth and needs of the older population (Deutsch et al., 2017). Previous studies have found that replacing general practitioners with healthcare professionals such as nurses is effective in disease management and health promotion among older adults (Dennis et al., 2009; Zwar et al., 2007). In the case of pain caused by systemic illness, older adults at home in the community are more likely to be hospitalized using emergency services or make repeated visits to the emergency department

(Aminzadeh & Dalziel, 2002). However, even in the event of complaints of oral pain and discomfort, natural tooth and gum pain, and gum bleeding, it was revealed that individuals last visited the dentist more than 3 years ago (Janto et al., 2022). Therefore, older adults in the community with comorbidities should undergo an assessment of their oral health problems by a nurse and be offered regular dental visits. Consequently, within the medical care system, hospitals and community nurses who are familiar with chronic disease management and are involved in dental health, including oral care, may be able to contribute more to oral health management by focusing on self-care, including oral cleaning and general health management, using oral assessment tools, and encouraging comprehensive HL for older residents in the community.

The aims of this study were (a) to investigate objective oral hygiene status with OHAT and OHRQoL using a self-reporting scale among community-dwelling older adults and (b) to clarify whether comprehensive HL is a factor associated with OHAT and OHRQoL.

METHODS

Study Design

This cross-sectional study was conducted from May 2019 to March 2020. Self-reported structured questionnaire data and participants' oral hygiene data using the OHAT were collected.

Participants and Procedures

Participants were people aged 65 and over who regularly participated in senior health classes and activities held at the community center in the city of Fukuoka. Recruitment was open to the public at five locations where research approval was obtained from the regional facility manager. Participation was voluntary. The exclusion criteria were as follows: (a) those who could not fill out the self-administered questionnaire and (b) those who had difficulty opening their mouth for oral cavity assessment. The aims and research protocols of this study were explained to the participants at the time of the survey. Once written informed consent was obtained, the questionnaire was distributed, completed, sealed, and collected in a collection box. When the questionnaire was distributed, the objective oral health status of all the subjects was appraised by the first author. The questionnaires and oral health data were prepared and managed in a correspondence table for anonymization.

All stages of this study were reviewed and approved by the author's university ethics review board and conducted in accordance with the Declaration of Helsinki. The researchers explained the purpose of the study to the participants in writing and verbally, guaranteeing anonymity and confidentiality to all participants.

INSTRUMENTS

Oral Health Assessment Tool. The OHAT is an oral assessment sheet developed to objectively screen oral problems in older adults (Chalmers et al., 2005; Matsuo & Nakagawa, 2016). Eight items relating to lips, tongue, gums and tissues, saliva, natural teeth, dentures, oral cleanliness, and dental pain are assessed on a three-point Likert scale consisting of healthy (0), changes (1), and unhealthy (2) (Matsuo & Nakagawa, 2016). Oral cleanliness is assessed based on the presence or absence of food residue, tartar, and plaque and is an item that reflects the self-care of older adults. The total score ranges from 0 to 16 points, with lower scores indicating better oral hygiene. The OHAT can be reliably appraised by nondental healthcare professionals (Everaars et al., 2020); the first author was trained by attending a seminar on oral assessment at which a dentist was a lecturer to make accurate measurements with the OHAT in this study. Furthermore, 38 participants in this study were appraised in conjunction with dental hygienists with more than 10 years of experience and the first author. The average concordance rate between the first author and the dental hygienists was 88.8%, confirming the reliability of the assessment.

General Oral Health Assessment Index. The general oral health assessment index (GOHAI; Atchison et al., 1998) is a self-administered scale of all 12 items measuring OHRQoL that subjectively assesses oral problems occurring in the past 3 months and includes items related to eating, swallowing, and oral pain and discomfort. Higher scores indicate higher OHRQoL. The reliability and validity of the Japanese version have been examined (Naito et al., 2006).

Comprehensive Health Literacy (HLS-Q12). The HL was measured using the short version of the European Health Literacy Survey Questionnaire (HLS-Q12; Finbråten et al., 2018). This is a short version of the European Health Literacy Survey Questionnaire (HLS-EU-Q47), which is a comprehensive 12-dimensional measure of four abilities (accessing, understanding, appraising, and applying health information) across the three areas of health care, disease prevention, and health promotion (Nakayama et al., 2015; Sørensen et al., 2012). This short version is a selection of one item per dimension from the original 12-dimensional 47-item scale (Nakayama et al., 2015; Sørensen et al., 2012). As an example, the item "How easy would you say it is to find information on healthy activities, such as exercise, healthy food, and nutrition?" was evaluated using a four-tier recourse format, including "very easy," "easy," "difficult," and "very difficult." "Not applicable/don't know" items were given a rating of 0 point. The score ranges from 12 to 48 points, with higher total scores indicating a higher HL.

SOCIODEMOGRAPHIC VARIABLES

The questionnaire provided sociodemographic variables such as gender, age, household members, educational level, self-reported economic status, and comorbidities.

STATISTICAL ANALYSES

The distribution of OHAT, GOHAI, and HLS-Q12 was confirmed by the Sha-piro–Wilk normality test. Because no normal distribution was found, the total score for each scale was displayed as a mean and median (interquartile range [IQR]). The GOHAI's age classification is based on data classifications of 60–69, 70–79, and 80–89 years from Japan's national standard values (Naito, 2006). This survey used a classification of 65 years of age and older. The distribution of each score of the 8 OHAT items was confirmed and the item of oral cleanliness, in which self-care is important, was classified into two groups of "unhealthy" and "healthy/changes," while the GOHAI was divided into two groups, with a 25th percentile value of 50. A χ test or Fisher's exact test was performed to investigate the association between OHAT oral cleanliness, GOHAI, and demographic variables. Furthermore, to assess whether comprehensive HL was a factor related to oral cleanliness in OHAT and GOHAI, a multiple logistic regression analysis was performed using a model with oral cleanliness and GOHAI as dependent variables. Gender and age were determined as independent variables based on previous studies (Wong et al., 2019). Furthermore, statistically significant variables such as oral cleanliness and GOHAI were used as independent variables in a univariate analysis. The comprehensive HL was divided into two groups based on previous studies (Finbråten et al., 2017; Guttersrud et al., 2019) and the 25th percentile of the subjects. All statistical analyses were performed using SPSS Ver.28 (IBM Corp., Armonk, NY, USA), with a significant difference of $p < .05$.

RESULTS

SOCIODEMOGRAPHIC CHARACTERISTICS

The characteristics of the participants in this survey are shown in Table 1. The questionnaires were distributed among 145 people who consented to participate in the study. The OHAT assessment was completed on the same day, and 118 people (81.4%) responded effectively to the questionnaire. Among the 118 subjects, 81 were females (68.6%), the average age was 75.8 years (*SD* = 5.7), and 66.9% lived with their spouse, parents, and/or children. Those with illnesses requiring oral medication accounted for 61.9% of all patients (Table 1).

OHAT AND GOHAI

The median OHAT total score was 4.0 points (IQR: 3.0–5.0), with a mean of 3.6 points (*SD* = 1.6) (Table 2). The distribution of the OHAT 8-item score ratings is shown in Figure 1. Approximately half of the respondents were assessed as "unhealthy" in terms of natural teeth, due to age-related dental attrition and tooth wear, followed by 18% who were "unhealthy" in terms of oral cleanliness. Saliva, lips, and level of dental pain were approximately 90% healthy (Figure 1).

TABLE 1. Participants' Characteristics (*N* = 118)

		N	%
Gender	Male	37	31.4
	Female	81	68.6
Mean age, years (range)	75.8 (65–89)		
Household members	Living alone	39	33.1
	Not alone	79	66.9
Educational level	Junior high school	7	5.9
	High school	74	62.7
	College	37	31.4
Self-reported economic status	Low	11	9.3
	Middle	85	72
	High	22	18.6
Presence of comorbidities	Yes	73	61.9
Comorbidities*	Hypertension	28	23.7
	Hyperlipidemia	15	12.7
	Diabetes	6	5.1
	Arthritis	4	3.4
	Other	30	25.4

Note. *Indicates multiple answers.

The median total GOHAI score was 56.0 points (IQR: 50.0–59.0), indicating that the median decreased as age increased when GOHAI was classified by age (Table 2).

Comprehensive Health Literacy

The median total score for the HLS-Q12 was 32.0 points (IQR: 27.0–38.3). The items for which most respondents answered "easy" or "very easy" included items of management and disease prevention behavior, such as "follow the instructions on medication" in the health care domain, "need for health screenings" in the Disease prevention domain, and "advice from family and friends." Furthermore, more than 60% of subjects responded with "easy" or "very easy" in the Health promotion domains, such as "make decisions to improve your health" (Table 3).

TABLE 2. Median Scores and Interquartile Ranges for OHAT and GOHAI (*N* = 118)

	N	Median	IQR		Mean	*SD*
OHAT	118	4	3	5	3.6	1.6
GOHAI	118	56	50	59	53.1	7.9
65–69 years GOHAI	15	57	51	58	53.8	6.5
70–79 years GOHAI	71	56	51	59	53.9	6.8
80–89 years GOHAI	32	55	43.3	60	50.8	10.2

Note. GOHAI = General Oral Health Assessment Index; IQR = interquartile range; OHAT = Oral Health Assessment Tool; *SD* = standard deviation.
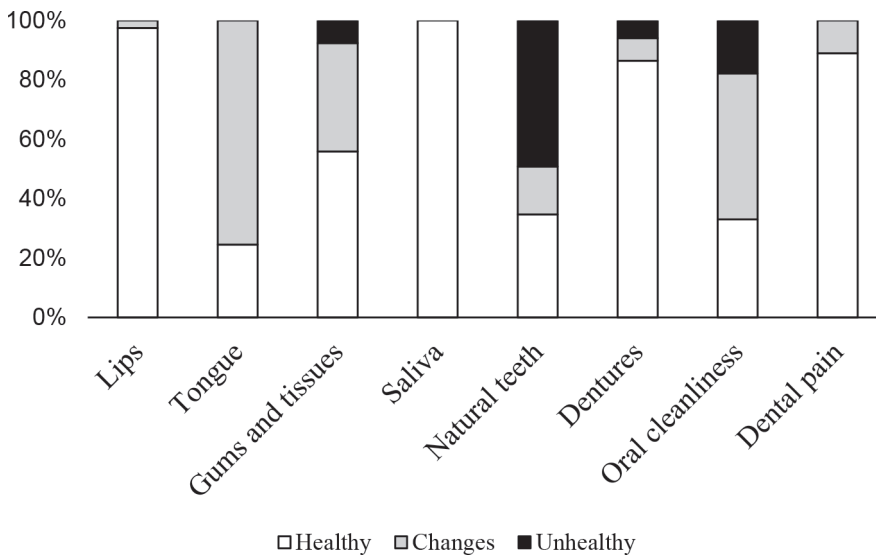
Figure 1. Proportion of participants with healthy, unhealthy, and changing status for each item from the OHAT (*N* = 118).
Note. For the 8 OHAT items, the percentage ratios of participants with the ratings "healthy," "changes," and "unhealthy" are shown; OHAT, Oral Health Assessment Tool.

Univariate Analysis of Oral Cleanliness and GOHAI

The results of the univariate analysis of oral cleanliness, GOHAI scores, and demographic variables are shown in Table 4. Gender differences (*p* < .001) and HLS-Q12 (*p* < .01) were observed as factors related to oral cleanliness, and among females, those with a high HLS-Q12 score had a higher rate of "healthy/changes" in terms of oral cleanliness. The HLS-Q12 (*p* < .01) was recognized as a related variable of GOHAI, with the GOHAI score being 50 points or more in the HLS-Q12 high scoring group.

Related Factors for Oral Cleanliness and GOHAI

The results of multiple logistic regression analysis with oral cleanliness and GOHAI as the dependent variables are shown in Table 5. Females were 5.63-fold more likely to be associated with good oral hygiene than males (odds ratio [OR] = 5.63, 95% confidence interval [CI] = 1.94–16.34, *p* < .01). Subjects in the HLS-Q12 high scoring group were 5.00-fold more likely to be associated with good oral hygiene compared with those in the HLS-Q12 low scoring group (OR = 5.00, 95% CI = 1.60–15.62, *p* < .01, Nagelkerke R^2 = 0.275). Regarding GOHAI-related factors, the subjects in the HLS-Q12 high scoring group were 3.33-fold more likely to be associated with good oral health-related QoL than those in the HLS-Q12 low scoring group (OR = 3.33, 95% CI = 1.26–8.80, *p* < .05, Nagelkerke R^2 = 0.104).

TABLE 3. Distribution of Responses to the Short Version of the European Health Literacy Survey Questionnaire (HLS-Q12) (*N* = 118)

Item no.	Original item no.	Health domain	Competence	Label	Very difficult, N (%)	Difficult, N (%)	Easy, N (%)	Very easy, N (%)
1	Q2	Healthcare	Accessing	Find information on treatments of illnesses that concern you?	8 (6.8)	53 (44.9)	46 (39.0)	11 (9.3)
2	Q7		Understanding	Understand what to do in a medical emergency?	14 (11.9)	54 (45.8)	37 (31.4)	13 (11.0)
3	Q10		Appraising	Judge the advantages and disadvantages of different treatment options?	14 (11.9)	58 (49.2)	34 (28.8)	12 (10.2)
4	Q14		Applying	Follow the instructions on medication?	2 (1.7)	20 (16.9)	49 (41.5)	47 (39.8)
5	Q18	Disease prevention	Accessing	Find information on how to manage mental health problems like stress or depression?	9 (7.6)	42 (35.6)	42 (35.6)	25 (21.2)
6	Q23		Understanding	Understand why you need health screenings?	5 (4.2)	26 (22.0)	44 (37.3)	43 (36.4)
7	Q28		Appraising	Judge if the information on health risks in the media is reliable?	10 (8.5)	52 (44.1)	41 (34.7)	15 (12.7)
8	Q30		Applying	Decide how you can protect yourself from illness based on advice from family and friends?	3 (2.5)	41 (34.7)	55 (46.6)	19 (16.1)
9	Q32	Health promotion	Accessing	Find information on healthy activities, such	4 (3.4)	36 (30.5)	53 (44.9)	25 (21.2)

(Continued)

TABLE 3. Distribution of Responses to the Short Version of the European Health Literacy Survey Questionnaire (HLS–Q12) (N = 118) (*Continued*)

Item no.	Original item no.	Health domain	Competence	Label	Very difficult, N (%)	Difficult, N (%)	Easy, N (%)	Very easy, N (%)
				as exercise, healthy food, and nutrition?				
10	Q38		Understanding	Understand information on food packaging?	1 (0.8)	45 (38.1)	42 (35.6)	30 (25.4)
11	Q43		Appraising	Judge which everyday behavior is related to your health?	2 (1.7)	39 (33.1)	50 (42.4)	27 (22.9)
12	Q44		Applying	Make decisions to improve your health?	2 (1.7)	37 (31.4)	45 (38.1)	34 (28.8)

Note. Original item no., European Health Literacy Survey Questionnaire (HLS–EU–Q47) item number.

TABLE 4. Association of Oral Cleanliness Scores and GOHAI With Other Variables (*N* = 118)

Variables category	Oral cleanliness					GOHAI				
	Unhealthy		Healthy and changes			<50		≥50		
	n	%	*n*	%	*p*-value	*n*	%	*n*	%	*p*-value
Gender										
Male	14	37.8	23	62.2	<.001	10	27	27	73	0.469
Female	7	8.6	74	91.4		17	21	64	79	
Age										
65–69 years	3	20	12	80	0.947	3	20	12	80	0.191
70–79 years	12	16.9	59	83.1		13	18.3	58	81.7	
≥80 years	6	18.8	26	81.3		11	34.4	21	65.6	
Educational level										
Junior high school	1	14.3	6	85.7	0.954	3	42.9	4	57.1	0.384
High school	13	17.6	61	82.4		17	23	57	77	
College	7	18.9	30	81.1		7	18.9	30	81.1	
Self-reported economic status										
Low	2	18.2	9	81.8	0.620[+]	4	36.4	7	63.6	0.222[+]
Middle/high	19	17.8	88	82.2		23	21.5	84	78.5	
Comorbidities										
Yes	13	17.8	60	82.2	0.997	18	24.7	55	75.3	0.559
No	8	17.8	37	82.2		9	20	36	80	
HLS-Q12										
27<	11	39.3	17	60.7	<.01[+]	12	42.9	16	57.1	<.01
27≥	10	11.1	80	88.9		15	16.7	75	83.3	

Note. GOHAI = General Oral Health Assessment Index; HLS-Q12 = short version of the European Health Literacy Survey Questionnaire. Pearson's chi-square test. [+]Fisher's exact test.

TABLE 5. Related Factors for Oral Cleanliness Scores and GOHAI (*N* = 118)

Factor	Category	Oral cleanliness				GOHAI			
		B	OR	(95% CI)	*p*	*B*	OR	(95% CI)	*p*
Gender	Male	1.73	5.63	(1.94–16.34)	< .01	0.11	1.12	(0.43–2.90)	0.824
	Female								
Age	65–69 years								
	70–79 years	0.36	1.43	(0.60–3.44)	0.422	−0.34	0.71	(0.33–1.52)	0.38
	≥80 years								
HLS-Q12	27<	1.61	5	(1.60–15.62)	< .01	1.2	3.33	(1.26–8.80)	< .05
	27≥								

Note. HLS-Q12, short version of the European Health Literacy Survey Questionnaire. The dependent variable in these models was oral cleanliness and GOHAI. The presence of poor oral cleanliness was coded as 0 (unhealthy), while good oral cleanliness was coded as 1 (either change or healthy). The presence of poor GOHAI was coded as 0 (GOHAI < 50), while good GOHAI was coded as 1 (GOHAI ≥ 50). Gender: Male = 0, Female = 1. Age: 65–69 years = 0, 70–79 years = 1, ≥80 years = 2; HLS-Q12: (Total score <27) = 0; (Total score ≥ 27) = 1. *B*: coefficient of partial regression; Multiple logistic regression analysis (forced entry method). CI, confidence interval; GOHAI, General Oral Health Assessment Index; OR, odds ratio.

DISCUSSION

This study confirmed that comprehensive HL in community-dwelling older adults in Japan is an associated factor for two oral health outcomes: objective oral cleanliness and OHRQoL. To our knowledge, this is the first study indicating that comprehensive HL, including the assessment and utilization of general health information, is associated with objective and subjective oral health in older adults. Our results indicate that comprehensive HL that changes clinical outcomes is an associated factor not only for general health but also for oral health, which suggests that HL interventions can be carried out by nurses in relation to oral health as well as comprehensive health care.

In actual home care, the harmful effects of poor oral health are often overlooked, and oral care is less prioritized than other health care (Archer et al., 2020). Although it is the responsibility of dental professionals to provide education on oral health, the role of nurses in maintaining oral health has become more important than ever because community nurses are at the forefront of caring for older adults. Therefore, community nurses are essential when it comes to deepening the knowledge, awareness, and understanding of oral health and related matters, and to improving patients' quality of life (Hazara, 2020).

The HLS-Q12 used in this study was developed to assess literacy related to overall health behavior, such as health care and disease prevention (Finbråten et al., 2018), with the advantage of being much easier to measure than the original scale of 47 question items (Sørensen et al., 2012). We believe that this was suitable for the subjects in this study. More than 80% of the subjects in this study responded that it was easy to comply with medications in the Health care domain. More than 60% of subjects had chronic diseases for which they were undergoing treatment with oral medication, with many of them receiving guidance on medication management from medical personnel, which is thought to have increased their HL.

The subjects in this study responded in the Disease prevention domain that it was easy to understand the necessity of medical examinations and to prevent disease through advice from family and friends. More than 90% of the older adult subjects responded, even in the previous research, that they easily understood the need for screening (Finbråten et al., 2020), the results of which were similar to this study. Furthermore, in comprehensive HL, individual HL and family HL were positively correlated, suggesting that limited individual HL capacity could be compensated for by family HL capacity (Ishikawa & Kiuchi, 2019). Therefore, it is believed that the subjects who answered that it was easy to prevent disease with the advice of family and friends could prevent disease due to the family's HL ability, even if the individual's HL ability was low.

The average OHAT total score, which is the outcome for oral hygiene in this study, was relatively good, as was the case with previous studies

(Kuo et al., 2021; Oishi et al., 2019) in community-dwelling healthy older adults (mean age: 70–79). However, in terms of the oral cleanliness item, which is a subitem of OHAT, the number of "healthy" responses was low, oral hygiene condition was poor due to food residue and tartar, and the oral cleanliness level was related to gender differences. Previous studies have reported that females have a lower rate of smoking and drinking than males and are more likely to engage in oral health behaviors (Samnieng et al., 2013), which is consistent with our finding that females had better oral cleanliness. Because many older adults answered that it was easy to understand the necessity for medical examinations based on the HL results, strategies to facilitate access to dental examinations need to be developed to prevent oral problems and subsequent effects on the overall health status to compensate for the lack of self-care, particularly among older men (Lee et al., 2016). While there was a high rate of "unhealthy" responses in terms of the natural teeth component of the OHAT subitem, due to a high level of tooth attrition and wear, the prevalence of moderate wear is 80% among older adults according to a survey of local residents in the Netherlands (Wetselaar et al., 2016). This is considered to be a characteristic of physiological aging in long-term tooth occlusion among subjects with an average age of 75.8 years. The median GOHAI in our study was similar to that obtained in a large study of community-dwelling older adults in Japan (Sekiguchi et al., 2020).

The following factors were limitations of this study: (a) The survey was conducted on older adults attending senior classes in a limited area, among subjects who had relatively good oral health and HL levels. Further studies should expand the target area and conduct more detailed research. (b) Because this was a cross-sectional investigation, no causal relationships can be drawn for factors relating to comprehensive HL, oral health, and OHRQoL. Further longitudinal studies will be required to demonstrate causal relationships.

IMPLICATIONS FOR NURSING PRACTICE

Because older adults are more likely to have comorbidities as well as oral health problems (Kassebaum et al., 2017), it is important for nurses to take the opportunity provided when following up on comorbidities to assess HL to improve oral health guidance and OHRQoL, while tailoring the approach for each individual.

A systematic review and metasynthesis of qualitative evidence reported that older adults improved HL by gaining more health information through collaborative learning with people close to them in the community (de Wit et al., 2017). A systematic review of self-management of chronic illnesses among those aged over 60 years also found that self-management and HL were related when community nurses and family were included as resources

to support self-management for older adults (Nguyen et al., 2022). In our study, 66.9% of the subjects—more than half—lived with their families, and the HL results further indicated that more than 63% stated that advice in the Disease prevention domain received from family and friends was effective. Therefore, health advice from not only individuals but also people with a similar lifestyle and culture in the community is important for older adults in determining health behavior; therefore, medical professionals should support families in giving appropriate advice.

This study assessed the difficulty associated with each aspect of the subjects' health care, disease prevention, and health promotion domains, by applying the comprehensive HL model (Sørensen et al., 2012) regarding health information to overcome systemic health issues for older adults living at home. This comprehensive HL indicated an association between oral hygiene and oral health-related QoL in older adults. Therefore, we believe that this study can serve as a conceptual basis for future knowledge development about effective oral health interventions for community-dwelling older adults aged 65 years and older.

CONCLUSION

Our findings indicate that a modifiable individual factor, HL, is associated with two oral health outcomes (oral cleanliness and OHRQoL) in community-dwelling older adults. These findings underscore the need to promote comprehensive HL interventions as a strategy for maintaining the oral health of older adults in the community. Application of the results of this study may be helpful in improving the future oral health of community-dwelling older adults.

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