Determinants of Oral Health-Related Quality of Life in Older People with Diabetes Mellitus: A Secondary Analysis of the 8th Korean Longitudinal Study of Aging (KLoSA) Dataset

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Abstract

Purpose : This study aimed to comprehensively evaluate the factors that influence the oral health-related quality of life (OHRQoL) of older adults with diabetes mellitus (DM) using the 8th Korean Longitudinal Study of Aging (KLoSA) dataset. **Methods :** This secondary analysis utilized the 8th KLoSA dataset from 2020, with a study sample of 1,144 older adults with DM. Dependent variable: OHRQoL; independent variables categorized into socio-demographic, oral health-related, and health-related characteristics. Complex Samples General Linear Model and Bonferroni correction in IBM SPSS/Win 26.0 were employed for assessing factors influencing OHRQoL. **Results :** The average OHRQoL was 33.96±0.28 points out of 60. Factors influencing OHRQoL included subjective health status (good: t = 3.00, p = .003; moderate: t = 4.38, p < .001), wearing dentures (yes) (t = -2.89, p = .004), having heart disease (t = -2.50, p = .013), having arthritis (t = -2.19, p = .028), and experiencing depression (t = -4.28, p < .001). These factors explained approximately 20% of OHRQoL in older adults with DM. **Conclusion :** To enhance OHRQoL in older adults with DM, it is crucial to consider psychological factors such as depression in the development of continuous oral health management programs. Additional factors to consider include effective denture management and chronic disease conditions.

Key words : Aged, Diabetes mellitus; Oral health, Quality of life

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Ⅰ. Introduction

In 2023, the proportion of the elderly population in South Korea reached 18.4%, projected to rise to 32.3% by 2040 [1]. As physical and mental functions decline with aging, efforts to maintain and manage health become crucial [2]. With diabetes mellitus (DM) becoming the most common chronic disease among older adults in a super-aging society [3], addressing its impact on oral health is imperative. Statistics in 2021 revealed a high prevalence of oral health problems among older adults [4].

Oral health significantly impacts functions such as chewing, swallowing, and pronunciation, crucial for overall physical health [5]. Loss of teeth can affect communication and appearance, leading to social issues and isolation [6]. These oral health problems can also contribute to psychological issues such as depression and sleep disorders [7], making oral health a critical factor affecting quality of life (QoL) in old age [7,8].

Dental pathologies, including periodontal disease, edentulism, tooth decay, and oral infections, are common among individuals aged 65 years and are associated with chronic diseases [9]. DM and oral health share a bidirectional relationship [10], with DM patients being more prone to periodontal disease [11]. Older individuals with DM also experience increased salivary glucose concentrations, leading to dental issues [12-14]. Managing oral health is crucial for older individuals with DM to maintain overall well-being.

Oral Health-Related Quality of Life (OHRQoL) is multidimensional, including attributes like oral health maintenance, functional and emotional well-being, aesthetic considerations, satisfaction with oral care, self-esteem, and social interactions [15]. Various factors influence OHRQoL in older individuals, including age, education, economic status, subjective health status, sensory function, denture wearing, number of missing teeth, chronic diseases, body mass index (BMI), lifestyle habits,

nutritional status, dietary habits, activities of daily living, cognitive function, and depression [7-9]. Patients with DM may also experience halitosis, plaque index, xerostomia, BMI, hypertension, and HbA1c levels affecting OHRQoL [10,16,17].

Despite research on OHRQoL in older adults, comprehensive studies analyzing factors related to OHRQoL in individuals with DM are lacking. This study aims to address this gap by comprehensively evaluating the factors influencing OHRQoL in older individuals with DM using the 8th Korean Longitudinal Study of Aging (KLoSA) dataset.

1. Aims

The specific objectives of this study are as follows: (1) to identify the socio-demographic, oral health-related, and health-related characteristics of older individuals with DM; (2) to assess the differences in OHRQoL among older individuals with DM according to socio-demographic, oral health-related, and health-related characteristics; and (3) to identify the factors influencing the OHRQoL in older individuals with DM.

Ⅱ. Methods

1. Research design

This study is a secondary data analysis aimed at identifying factors influencing the OHRQoL in older adults over 65 years with DM, using the 8th wave data of KLoSA from 2020.

2. Participants

This study utilized data from the 8th wave of the

KLoSA, conducted in 2020 [18]. The KLoSA aims to furnish fundamental data on aging by generating statistically representative and reliable information at both national and provincial levels. It serves as a vital resource for researching various aspects such as social, economic, and physical and mental well-being factors. The survey targeted general household residences of individuals aged 45 years and older in South Korea, excluding Jeju Island. Constructed from the survey districts of the 2005 Population and Housing Census, a panel of 10,254 people was established for the first survey in 2006, with subsequent surveys conducted every 2 years until the 8th survey in 2020. Utilizing computer-assisted personal interviewing, interviewers employed laptops to pose questions and input responses directly using a keyboard or mouse. The specific inclusion criteria for this study were individuals aged 65 years or older. In the 8th year of the study, 6,488 participants were enrolled, of whom 4,406 were aged 65 years or older (with 2,083 aged ≤ 64 years). Among older adults aged 65 years or older, 1,144 diagnosed with DM were selected as the final study participants.

3. Measurements

The dependent variable for this study is OHRQoL, while the independent variables are derived from the 8th wave of KLoSA data. These variables encompass socio-demographic, oral health-related, and health-related characteristics, categorized as per KLoSA or reclassified by the researchers for this study.

1) OHRQoL

Initially developed by Atchison and Dolan [19], the OHRQoL instrument was translated into Korean and validated by Shin and Jung [20] using the Korean version of the Geriatric Oral Health Assessment Index (GOHAI). This 6-point Likert scale ranges from 0 ("always") to 5 ("never"), with a score range of 0 to 60. Higher scores indicate a superior OHRQoL. The original study reported a Cronbach's α of .83, while the present study found a reliability of Cronbach's α = .89.

2) Socio—demographic characteristics

General characteristics encompassed gender, age, education, cohabitants, and subjective socioeconomic status. Gender was categorized as male or female, age calculated by subtracting the participant's year of birth from the survey year (2020). Education was divided into three categories: elementary school graduation or below, middle school graduation, and high school graduation or higher. Cohabitants were categorized as either living alone or with others. Subjective socioeconomic status was classified as high, medium, or low.

3) Oral health—related characteristics

These included denture wearing and natural tooth count. Natural tooth count refers to the current count of all teeth, including roots, excluding third molars (wisdom teeth).

4) Health—related characteristics

These comprised subjective health status, difficulty in daily activities due to vision or hearing impairment, regular meal habits, BMI, presence of hypertension, cancer, chronic obstructive pulmonary disease (COPD), heart disease, cerebrovascular disease, mental illness, arthritis, dementia, activities of daily living (ADL), instrumental activities of daily living (IADL), and depression. Subjective health status was categorized as good, moderate, or poor. Regular meals were assessed based on the consumption of breakfast, lunch, and dinner over the past two days. BMI was classified as underweight (<18.5 kg/m²), normal weight (18.6-22.9 kg/m²), overweight (23.0-24.9 kg/m²), and obese (≥ 25 kg/m²). ADL and IADL were

assessed using the Korean version of the Functional Independence Measure [21], with higher scores indicating greater dependence. Depression was measured using the Korean-translated version of the Center for Epidemiologic Studies Depression Scale (CES-D10) [22], with higher scores indicating higher levels of depression.

4. Data collection

This study employed secondary data analysis, conducted after obtaining approval from the Institutional Review Board (IRB No. JBNU 2022-06-031) of the researcher's affiliated institution. Raw data, survey instruments, and the codebook for the 8th KLoSA were obtained through the data request process specified on the website of the Korea Employment Information Service [18].

5. Data analysis

Data analysis was performed using SPSS/WIN 26.0 (IBM Corp, Armonk, USA) software. In the 8th wave of KLoSA, stratified variables and survey clusters were designated as cluster variables in the sample design. After applying integrated weights, a composite sample design analysis file was created. Descriptive statistical analysis results were presented as unweighted (n) and weighted percent (W(%)), along with means and standard errors. Differences in OHRQoL among older people with DM, based on their general and health-related characteristics, were analyzed using the Complex Samples General Linear Model (CSGLM) for univariate analysis. Post-hoc analysis was validated using Bonferroni correction. Factors influencing the OHRQoL of older people with DM were examined through multivariate analysis using CSGLM.

Table 1. General and Health-related Characteristics of the Participants (N=1,144)

Characteristics	Category	n (weighted %†)	M±SE
Socio-demographic characteristics			
Gender	Male	490 (45.1)	
	Female	654 (54.9)	
Age (years)	65-69	217 (28.1)	74.84±0.24
	70-79	518 (45.8)	
	≥80	409 (26.1)	
Education	≤Elementary school or below	641 (51.0)	
	Middle school	189 (18.0)	
	≥High school or higher	314 (31.0)	
Cohabitants	Living alone	224 (18.2)	
	Living with others	920 (81.8)	
Subjective socioeconomic status	High	10 (1.0)	
	Medium	521 (46.9)	
	Low	613 (52.1)	
Oral health-related characteristics			
Wearing dentures	Yes	419 (33.3)	
	No	724 (66.7)	
Natural teeth count	<20	576 (47.9)	16.01±0.43
	≥20	568 (52.1)	

Table 1. (continued)

Characteristics	Category	n (weighted %[†])	M±SE
Health-related characteristics			
Subjective health status	Poor	262 (25.2)	
	Moderate	460 (40.7)	
	Good	422 (34.1)	
Difficulty in daily activities due to current vision impairment	Yes	56 (5.0)	
	No	1,082 (95.0)	
Difficulty in daily activities due to hearing impairment	Yes	86 (6.3)	
	No	1,058 (93.7)	
Hypertension	Yes	867 (76.5)	
	No	272 (23.5)	
Cancer	Yes	109 (9.0)	
	No	1,035 (91.0)	
COPD	Yes	48 (4.1)	
	No	1,079 (95.9)	
Heart disease	Yes	210 (17.7)	
	No	934 (82.3)	
Cerebrovascular disease	Yes	125 (10.8)	
(n=1,131)	No	1,006 (89.2)	
Mental illness	Yes	70 (6.3)	
	No	1,074 (93.7)	
Arthritis	Yes	454 (36.8)	
	No	690 (63.2)	
Dementia	Yes	23 (1.5)	
	No	1,121 (98.5)	
Smoking	Non	754 (63.0)	
	Ex	316 (29.4)	
	Current	74 (7.6)	
Drinking	Non	579 (46.9)	
(n=1,143)	Ex	324 (29.0)	
	Current	240 (24.1)	
Regular meal habits	Regular	1,046 (90.6)	
	Irregular	98 (9.4)	
Body mass index	Obesity	358 (34.8)	24.06±0.11
(n=1,121)	Overweight	337 (28.9)	
	Normal	386 (32.9)	
	Underweight	40 (3.4)	
ADL			0.28±0.04
IADL			0.92±0.08
Depression			3.25±0.11
GOHAI			33.96±0.28

ADL=activities of daily living; COPD=Chronic obstructive pulmonary disease; IADL=Instrumental activities of daily living; M±SE=estimeated mean±standard error; GOHAI=Geriatric Oral Health Assessment Index.
[†]unweighted count (weighted %)

Ⅲ. Results

1. OHRQoL level and characteristics of the participants

In this study, the OHRQoL was found to be at a moderate level, with an average score of 33.96±0.28 out of 60 points (Table 1). The study included 1,144 older people with DM, of whom 54.9% were female. The majority of participants were in their 70s (45.8%), and over half had an elementary school education level or lower (51.0%). Furthermore, 81.8% of the participants were living with their family members. Regarding the subjective socioeconomic status perceived by the participants, 52.1% responded as 'low'. In terms of oral health-related characteristics, 33.3% wore dentures. The natural teeth count was less than 20 for 47.9% of the participants, while 52.1% had 20 or more natural teeth.

In addition, in terms of health-related characteristics, 34.1% of respondents reported their subjective health status as "good," and 90.6% reported having regular meals. In terms of BMI, 34.8% were obese, 32.9% were normal, and 28.9% were overweight. The prevalence of comorbidities was as follows: hypertension (76.5%), cancer (9.0%), COPD (4.1%), heart disease (17.7%), cerebrovascular disease (10.8%), mental illness (6.3%), arthritis (36.8%), and dementia (1.5%). The average scores for ADL and IADL were 0.28 ± 0.04 (out of 7 points) and 0.92 ± 0.08 (out of 10 points), respectively. The average score for depression was 3.25 ± 0.11 (out of 10 points) (Table 1).

Table 2. Difference in OHRQoL according to General Characteristics (N=1,144)

Characteristics	Category	M±SE	t or F	p	post-hoc[§]
Gender	Male	34.47±0.42	1.81[†]	.071	
	Female	33.55±0.35			
Age (years)	65-69[a]	35.88±0.48			
	70-79[b]	33.91±0.42	17.33[†]	<.001	a〉b〉c
	≥80[c]	31.99±0.46			
Education	≤Elementary school or below	32.88±0.38			
	Middle school	34.86±0.71	8.16[†]	<.001	a<b,c
	≥High school or higher	35.23±0.45			
Cohabitants	Living alone	33.07±0.63	-1.61[†]	.107	
	Living with others	34.16±0.31			
Subjective socioeconomic status	High	32.24±2.92			
	Medium	34.58±0.42	2.84[†]	.060	
	Low	33.43±0.35			

M±SE=estimeated mean±standard error; OHRQoL=oral health-related quality of life
[†]t-statistical value
[†]Wald F-statistical value
[§] Bonferroni correction

2. OHRQoL according to the socio-demographic characteristics

Significant differences in OHRQoL were observed in relation to age and education. The age group of 65-69 years old showed the highest OHRQoL score at 35.88 points, followed by the 70-79 age group at 33.91 points, and the 80 years and older age group at 31.99 points (F = 17.33, $p < .001$). Additionally, individuals with a higher level of education, such as high school graduates or above, had higher scores for OHRQoL (35.23 points) compared to those with an elementary school education or below (32.88 points) (F = 8.16, $p < .001$) (Table 2).

3. OHRQoL according to the oral health-related characteristics

The oral health-related characteristics that showed significant differences in OHRQoL are listed in Table 3. Participants wearing dentures (31.48 points) had a lower OHRQoL compared to those without dentures (35.20 points) (t = -6.89, $p < .001$). Those individuals with a natural tooth count of 20 or more (35.43 points) had a higher OHRQoL compared to those with fewer than 20 teeth (32.37 points) (t = -5.75, $p < .001$) (Table 3).

4. OHRQoL according to the health-related characteristics

The health-related characteristics that showed significant differences in OHRQoL are listed in Table 4. Subjective health status was significantly associated with higher OHRQoL for individuals reporting good (35.78 points) and moderate (35.51 points) health compared to those reporting poor health (30.78 points) (F = 35.90, $p < .001$). Individuals who reported difficulties in their daily lives due to visual or hearing impairments had a lower OHRQoL compared to those who did not report such difficulties (t = -2.67, $p = .008$; t = -3.81, $p < .001$). Regular meal consumption was associated with a higher OHRQoL compared to irregular consumption (t = 2.09, $p = .037$).

In the BMI, individuals classified as obese (34.31 points), overweight (34.75 points), and normal weight (33.50 points) had a higher OHRQoL compared to underweight individuals (30.79 points) (F = 3.65, $p = .013$). Participants with hypertension (t = -3.56, $p < .001$), COPD (t = -2.17, $p = .030$), heart disease (t = -3.89, $p < .001$), arthritis (t = -4.92, $p < .001$), and dementia (t = -3.01, $p = .003$) had lower OHRQoL scores compared to those without these conditions. It was found that as ADL and IADL scores increased, OHRQoL significantly improved (r = .18, $p < .001$; r = .22, $p < .001$), while higher depres-

Table 3. Difference in OHRQoL according to Oral Health-related Characteristics (N = 1,144)

Characteristics	Category	M±SE	t	p
Wearing dentures	Yes	31.48±0.45	-6.89	<.001
	No	35.20±0.33		
Natural teeth count	<20	32.37±0.42	-5.75	<.001
	≥20	35.43±0.35		

OHRQoL = oral health-related quality of life; M±SE = estimeated mean±standard error.

Table 4. Difference in OHRQoL according to Health-related Characteristics   (N = 1,144)

Characteristics	Category	M±SE	t, F or r	p	post-hoc[ǁ]
Subjective health status	Bad[a]	35.78±0.62			
	Moderate[b]	35.51±0.28	35.90[†]	<.001	a,b〉c
	Good[c]	30.78±0.49			
Difficulty in daily activities due to vision impairment	Yes	29.06±1.92	-2.67[‡]	.008	
	No	34.26±0.27			
Difficulty in daily activities due to hearing impairment	Yes	28.89±1.41	-3.81[‡]	<.001	
	No	34.30±0.27			
Hypertension	Yes	33.50±0.33	-3.56[‡]	<.001	
	No	35.42±0.46			
Cancer	Yes	34.93±0.68	1.51[‡]	.132	
	No	33.87±0.30			
COPD	Yes	31.02±1.40	-2.17[‡]	.030	
	No	34.07±0.28			
Heart disease	Yes	31.90±0.60	-3.89[‡]	<.001	
	No	34.41±0.30			
Cerebrovascular disease (n=1,131)	Yes	32.77±0.73	-1.67[‡]	.095	
	No	34.10±0.30			
Mental illness	Yes	31.71±1.22	-1.92[‡]	.055	
	No	34.11±0.29			
Arthritis	Yes	32.22±0.51	-4.92[‡]	<.001	
	No	34.98±0.30			
Dementia	Yes	26.99±2.35	-3.01[‡]	.003	
	No	34.07±0.28			
Smoking	Non	34.04±0.32			
	Ex-smoker	33.78±0.57	0.89[†]	.912	
	Current	34.02±0.81			
Drinking (n=1,143)	Non	33.68±0.34			
	Ex-drinking	33.05±0.63	8.25[†]	.001	a,b<c
	Current	35.60±0.45			
Regular meal habits	Regular	34.16±0.29	2.09[‡]	.037	
	Irregular	32.00±1.01			
Body mass index (n=1,121)	Obesity[a]	34.31±0.41			
	Overweight[b]	34.75±0.43	3.65[†]	.013	a,b,c<d
	Normal[c]	33.50±0.55			
	Underweight[d]	30.79±1.16			
ADL			.18[§]	<.001	
IADL			.22[§]	<.001	
Depression			-.26[§]	<.001	

ADL=activities of daily living; COPD=Chronic obstructive pulmonary disease; HRQoL=health-related quality of life; IADL=Instrumental activities of daily living; M±SE=estimeated mean±standard error.
[†]Wald F-statistical value; [‡]t-statistical value; [§]r-statistical value; [ǁ]Bonferroni correction

Table 5. Factors Influencing OHRQoL (N = 1,144)

Variables	B	SE	t	p	VIF
(Constants)	34.35	1.44	23.92	<.001	
Age (70-79)[†]	-0.28	0.79	-0.35	.724	2.39
Age (≥80)[†]	-0.55	0.56	-0.97	.330	1.95
Education (≥high school or higher)[†]	0.28	0.58	0.48	.635	1.37
Education (middle school)[†]	0.52	0.70	0.74	.462	1.21
Wearing dentures (yes)[†]	-1.79	0.62	-2.89	.004	1.31
Natural teeth count (≥20)[†]	0.91	0.53	1.70	.089	1.26
Subjective health status (good)[†]	2.34	0.78	3.00	.003	1.57
Subjective health status (moderate)[†]	2.31	0.53	4.38	<.001	1.51
Difficulty in daily activities due to current vision impairment (yes)[†]	-2.06	1.64	-1.25	.210	1.10
Difficulty in daily activities due to hearing impairment (yes)[†]	-1.58	1.17	-1.35	.178	1.21
Hypertension (yes)[†]	-0.27	0.52	-0.52	.601	1.09
COPD (yes)[†]	-1.77	1.19	-1.49	.137	1.02
Heart disease (yes)[†]	-1.45	0.58	-2.50	.013	1.06
Arthritis (yes)[†]	-1.18	0.54	-2.19	.028	1.20
Dementia (yes)[†]	-3.00	2.47	-1.21	.225	1.13
Drinking (current)[†]	-0.29	0.53	-0.55	.583	1.27
Drinking (ex-drinking)[†]	-1.16	0.60	-1.93	.053	1.20
Regular meal habits (regular)[†]	0.84	0.95	0.88	.377	1.09
Body mass index (obesity)[†]	0.53	0.60	0.88	.377	1.38
Body mass index (overweight)[†]	0.46	0.57	0.81	.418	1.34
Body mass index (underweight)[†]	-0.04	1.38	-0.03	.979	1.12
ADL	-0.45	0.29	-1.59	.112	2.28
IADL	0.08	0.19	0.42	.672	2.74
Depression	-0.39	0.09	-4.28	<.001	1.15
$R^2 = .20$, Wald F=8.36, $p<.001$					

ADL=activities of daily living; COPD=chronic obstructive pulmonary disease; OHRQoL=oral health-related quality of life; IADL =instrumental activities of daily living; SE=standard error; VIF=variance inflation factor.
[†]References were Age (65-69), Education (≤elementary school or below), Wearing dentures (no), Natural teeth count (<20), Subjective health status (poor), Difficulty in daily activities due to current vision impairment (no), Difficulty in daily activities due to hearing impairment (no), Hypertension (no), COPD (no), Heart disease (no), Arthritis (no), Dementia (no), Drinking (no), Regular meal habits (irregular), and Body mass index (underweight).

sion scores were associated with a significant decrease in OHRQoL (r=-.26, $p<.001$) (Table 4).

5. Factors influencing OHRQoL

In order to identify the factors influencing the OHRQoL of the subjects, a complex sample general linear analysis was conducted. In the univariate CSGLM, independent variables that showed significant differences in OHRQoL were included. These variables included subjective health status, difficulty in daily activities due to vision impairment, difficulty in daily activities due to hearing impairment, denture wearing, natural teeth count, regular meal habits, BMI, hypertension, heart disease, arthritis, dementia, ADL, IADL, and depression.

Variables that significantly influence the OHRQoL are subjective health status (good), subjective health status (moderate), wearing dentures (yes), heart disease (yes), arthritis (yes), and depression. Specifically, individuals who reported their subjective health status as 'good' or 'moderate' had a higher OHRQoL, with average scores of 2.34 and 2.31, respectively, compared to those who reported it as 'poor' (t=3.00, $p=.003$; t=4.38, $p<.001$). Participants wearing dentures had an average OHRQoL score that was 1.79 points lower than those who did not wear dentures (t=-2.89, $p=.004$). Individuals with heart disease had an average score that was 1.45 points lower than those without heart disease (t=-2.50, $p=.013$). Similarly, individuals with arthritis had an average score that was 1.18 points lower than those without arthritis (t=-2.19, $p=.028$). Lastly, it was found that as the level of depression increased, the OHRQoL significantly decreased (t=-4.28, $p<.001$) (Table 5).

Ⅳ. Discussion

This study seeks a comprehensive understanding of the factors influencing the OHRQoL in older adults with DM using multivariate analysis and data sourced from the 8th wave of the KLoSA. The objective is to establish baseline data that can inform the development of nursing intervention programs, targeting modifiable factors to enhance OHRQoL in older adults with DM.

In our investigation, the average OHRQoL score for older adults with DM was determined to be 33.96 out of 60 points. Significantly, this score was lower than the 46.67 points reported in a prior study utilizing the same tool (GOHAI) on individuals without DM [23]. Furthermore, it fell below the average score of 46.15 ± 7.22 points reported for older adults without DM [24]. This finding aligns with a previous study [11] that similarly reported diminished OHRQoL scores among older adults with DM compared to their non-diabetic counterparts.

Older adults with DM exhibit a higher glucose concentration in their saliva, attributed to reduced saliva secretion. This diminished saliva flow compromises the oral cleansing process, resulting in the accumulation of dental plaque and, subsequently, a heightened prevalence of dental caries and periodontal disease within this population [10,12,13]. Moreover, bacteria causing periodontal disease and their toxins circulate in the bloodstream, leading to systemic inflammation. Inflammatory mediators produced in periodontal lesions can travel through the bloodstream to various tissues, exacerbating insulin resistance and diminishing blood sugar control [2,10]. Consequently, it is imperative to implement an intervention program that can bolster and sustain the oral health of older adults with DM to regulate blood sugar levels effectively. This underscores the importance of maintaining healthy teeth and emphasizes that optimal blood sugar control is fundamental for dental health. Through such measures, it becomes feasible to mitigate the occurrence of chronic complications arising from diabetes.

The current study employed a multivariate linear regression analysis on a composite sample to discern the factors influencing the OHRQoL of older adults with DM. The findings unveiled that subjective health status, denture wearing, heart disease, arthritis, and depression emerged as significant factors shaping OHRQoL.

Specifically, participants who reported their subjective health status as "good" or "moderate" exhibited higher OHRQoL compared to those reporting it as "poor." This aligns with prior research suggesting a positive association between higher subjective health status and elevated OHRQoL in both male and female elderly individuals [25]. Subjective health status, being easily obtained through surveys, encapsulates a holistic evaluation of physiological, physical, psychological, and social dimensions of health that extends beyond conventional medical measurements [25]. Given the observed correlation, it becomes imperative to strategize interventions geared towards enhancing subjective health status to, in turn, elevate OHRQoL among older adults with DM.

Furthermore, the study highlighted that older adults with DM who wore dentures exhibited lower OHRQoL compared to non-denture wearers. These findings resonate with existing research indicating poorer oral health status among elderly individuals relying on dentures [11]. While dental prosthetic treatment for severe tooth loss can restore oral function and improve QoL, it introduces challenges such as impaired oral hygiene management and potential oral complications over time [26]. Denture use may exacerbate oral dryness, contribute to halitosis, and elevate the risk of conditions like stomatitis and oral candidiasis, all of which can diminish OHRQoL [26]. Additionally, the association between DM and periodontal ligament destruction, leading to tooth loss, further accentuates the challenges faced by older adults with DM [7]. Research indicates that structured oral care interventions, particularly group education, can enhance subjective oral health status, alleviate oral dryness, and improve OHRQoL among elderly individuals wearing dentures [27]. To optimize the OHRQoL of older adults with DM who wear dentures, it is imperative to tailor and enhance structured oral care nursing interventions, ensuring they cater to the specific needs of this demographic.

In the context of this study, older individuals grappling with chronic conditions such as heart disease and arthritis exhibited a diminished OHRQoL compared to their counterparts without these conditions. These findings closely align with existing research, reinforcing the notion that older individuals with heart disease and arthritis tend to experience lower OHRQoL than those devoid of these conditions [8]. Substantial evidence has shed light on the interplay between periodontal diseases and cardiovascular conditions. A systematic review and meta-analysis have demonstrated that individuals with severe periodontal disease face an elevated risk of developing cardiovascular diseases [28]. Furthermore, a correlation has been observed between periodontal disease and rheumatoid arthritis, with suggestions that both conditions share common underlying pathogenic mechanisms. Individuals with rheumatoid arthritis often present a high incidence of tooth loss, a consequence attributed to periodontal disease [8]. A prior study investigating the relationship between oral health beliefs, behaviors, and QoL among patients with chronic illnesses highlighted the significant impact of perceived barriers and benefits on oral health behaviors [29]. Sensitivity, barriers, and benefits were identified as significant influencers of OHRQoL [29]. To enhance oral health behaviors among older individuals with diabetes mellitus and concurrent chronic illnesses, it becomes imperative to develop and implement educational materials that amplify perceived benefits and alleviate barriers associated with oral health behaviors. Such initiatives have the potential to positively influence adherence to oral health practices, thereby promoting overall oral health and well-being in this vulnerable population.

This study unveiled a noteworthy correlation between the level of depression in older adults with DM and a subsequent decrease in their OHRQoL. These findings resonate with prior research, which has consistently reported a negative correlation between depression levels and dental condition, the number of missing teeth, and oral dryness [7]. Depression, prevalent in the elderly population with DM [30], exerts a tangible impact on oral health. Neglect of oral hygiene practices, consumption of foods contributing to tooth decay, and avoidance of essential dental care are common manifestations of depression. These behaviors culminate in an increased susceptibility to dental caries and periodontal disease [7]. The intricate relationship between oral health and negative psychological symptoms, such as depression, underscores the importance of implementing systematic oral disease prevention and management. Incorporating emotional management programs becomes crucial to maintaining both physical and emotional stability in older adults.

However, this study is not without limitations. Firstly, the cross-sectional nature of the 8th wave of the KLoSA hinders the establishment of causal relationships between factors influencing OHRQoL in older people with DM. The inability to capture trends over time underscores the need for future research to employ longitudinal analysis. Secondly, the study's reliance on raw data from the KLoSA, collected for diverse purposes, limited the inclusion of detailed variables related to OHRQoL in older people with DM. Additionally, the selective utilization of raw data constrained the depth of the analysis. Despite these limitations, this study remains significant in its endeavor to analyze various factors impacting the OHRQoL of older people with DM, utilizing the expansive KLoSA dataset representing a large population group in South Korea.

V. Conclusion and Recommendation

In the current study, our investigation revealed the profound influence of oral and health-related characteristics on the OHRQoL of older adults with DM. These findings lay a crucial groundwork for the development of a comprehensive oral healthcare program, with the potential to significantly enhance the OHRQoL of this demographic. Furthermore, the insights garnered from this study can inform the establishment of pertinent oral health policies geared towards the prevention of oral diseases.

Building on these findings, to elevate the OHRQoL of older adults with DM, it is imperative to incorporate psychological factors such as depression into the design of continuous oral health-management programs. Additionally, effective management of dentures and chronic disease conditions should be integral components of these initiatives. This holistic approach recognizes the interconnectedness of oral and overall health, ensuring a more comprehensive and effective strategy for improving OHRQoL.

As a recommendation for future research, there is a need for more extensive studies that encompass various factors related to DM. The exclusion of critical variables, such as HbA1c, fasting blood glucose, gum bleeding, bad breath, and xerostomia in this study due to limitations in the KLoSA dataset, underscores the importance of exploring these factors in greater detail. Addressing these variables could provide a more nuanced understanding of the multifaceted relationship between DM and OHRQoL, ultimately contributing to the refinement of interventions and policies for this vulnerable population.

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