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### Clinical Predictors Related to Oral Health-Related Quality of Life (OHRQoL) in Korean Elderly for Visiting Oral Healthcare

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#### **Abstract**

The purpose of the study was to investigate the level of oral health and oral health related Activities of Daily Living (ADL) and the clinical factors influencing Oral Health Related Quality of Life (OHRQoL) in Korean elderly. Data were obtained from a cross-sectional survey of 256 elderly people (mean age = 78.9±5.36). Participants were recruited when they attended the public health center in Chungnam. Data were collected by means of oral examination and personal interview from September 19 through to October 20, 2012. Oral health related ADL, OHRQoL and dry mouth were measured by a total 24 item. The data were analyzed with t-test, one-way Analysis of Variance (ANOVA), and stepwise multiple regression using the Statistical Package for the Social Sciences (SPSS) program. Participants had a mean of 12.0 remaining natural teeth, which was significant with age and perceived oral health. Decayed-Missing-Filled Teeth (DMFT) index achieved a mean of 15.8. Powerful predictors of OHRQoL were masticatory difficulty, oral pain, residential type, perceived oral health, frequency of brushing and perceived health in elderly. Based on the findings, OHRQoL has a significantly impact on oral health related ADL. These results suggest that elderly oral health promotion should be developed according to assessment index which measured predictors related to oral health in the elderly.

**Keywords:** Oral Health, Oral Health Related Activities of Daily Living, Oral Health Related Quality of Life, Visiting Oral Healthcare, Xerostomia

#### 1. Introduction

One of the social changes in the 21st century is the increase of elderly population. As healthcare and social environment such as medical technology, environmental hygiene, and living standards largely improved and enhanced, human lifespan rapidly expanded and elderly people gradually increased<sup>1</sup>. The ratio of elderly over the age of 65 rose from 3.8% in 1980 30 years ago to 5.1% in 1990, and 7.2% in 2000 to enter an aging society and it was 11% in 2010 showing a steep trend of increase<sup>2</sup>.

Configuration form of elderly households also showed much change and in 2010 the number of 'single elderly households (elderly people living alone)' over the ages 65 was 1.021 million which composed 6.0% of all households and this predicted that it will continuously increase until one in every 10 households (11.8%) 20 years later in 2030 which suggests that establishment measures for this must be done urgently<sup>2</sup>. Increase of elderly population brings increase of demand for home care service due to need for care protection such as dementia and paralysis<sup>3</sup> and increase of prevalence of chronic degenerative diseases and because it is predicted that the vicious

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circle where oral health is more and more neglected due to various systemic diseases and health-related quality of life decrease which requires active systemic and oral management service in the future for these people.

For oral health in the elderly in Korea, elderly people age 75 maintain 10.4 of their teeth. 41.7% of elderly have complete dentures and 13.6% of elderly need total dentures showing that oral health is greatly severe<sup>4</sup>.

The oral status of disabled elderly is more severe and 48.7% of elderly over the age of 65 had fewer than 10 teeth and among 23.7% people with no teeth it was investigated that 37% did not have dentures<sup>5</sup>. Also although due to the increase of elderly households there are increases of various economic needs in life, health and emotional needs, and social support required by these people there is low awareness and utilization of elderly welfare services that can satisfy their needs and because there is weakness of elderly welfare service supply base, lack of delivery systems, and lack of care service systems focused on regional society, the reality is that there is not even the minimum of welfare service provision infrastructure and it is becoming a serious social problem<sup>6</sup>.

The government is conducting a visiting healthcare business for public health service provision. Visiting healthcare service is where the public health care institution provides healthcare service by visiting the household of local residents and visiting healthcare business is coming in place as a representative program to solve health needs and welfare needs of the elderly within the regional society. With the introduction of personalized visiting healthcare program in 2007 staffing for dental hygienists that will be responsible for oral health started and although it is in small scale, currently there is a visiting oral healthcare program<sup>7</sup>.

However, compared to the need, visiting oral health program does not yet provide a wide range of services for its subjects and because it is not independent from visiting healthcare program, it is difficult to achieve business performance8. To activate visiting oral health program in response to the coming aging society, there needs to be close review of oral health-related factors of subjects to reflect on the business. Current status investigation about visiting oral health program has been partly done<sup>5,7-9</sup> but the reality is that there is lack of researches that figure out the determinants that influence the level of oral health in visiting health care program subjects.

Therefore the study tried to explore oral health status and oral health-related Activities of Daily Living (ADL) in visiting oral health program subject elderly over the age of 65 residing in some areas and figure out the related factors that influence Oral Health Related Quality of Life (OHRQoL) to provide basic data that can be reflected on development of an elderly oral health improvement program.

#### 2. Methods

#### 2.1 Study Design

This study is a descriptive correlation research that measured the level of oral health related factors in Korean elderly and figured out the related factors that influenced OHRQoL.

#### 2.2 Study Subjects

267 elderly over the age of 65 that resided in residential homes or free or silver care facilities in three urban rural complex cities in Chungnam were chosen as subjects. Among the collected data, excluding 11 surveys where responses to the survey information was inadequate, a total of 265 (95.9%) was chosen for the final analysis subjects and it was found that the average age was 78.9±5.36.

The number of study subjects samples were set as significance level  $\alpha = 0.05$  and size of the effect moderate = 0.25, power = 0.95 according to power analysis suggested by Cohen and in the calculation of the necessary number of samples 225 was required.

#### 2.3 Study Procedures

From September 19 to October 20, 2012, a trained researcher visited with two assistants to explain the research purpose to selected subjects and oral examination and interviews were conducted on people who voluntarily agreed. The oral examination measured the number of existing natural teeth, the number of Decay-Missing-Filled Teeth (DMFT), and that your status according to the standards recommended by the World Health Organization (WHO)<sup>10</sup>. The structured interview survey was written based on previous literature and with advisory from three experts it was modified and supplemented then preliminary examination was done on 10 people, then after reediting the items that the subjects were giving ambiguous responses to, it was used in this survey.

#### 2.4 Study Tools

In the survey content there were six items for general characteristics including residence, gender, age, family type, perceived oral health, and perceived health and other things such as oral health related ADL, OHRQoL, and xerostomia.

For oral health related quality of life, Oral Health Impact Profile (OHIP)-14, a simplified version of Oral Health Impact Profile (OHRQoL) was used  $^{11}$ . This is based on a conceptual model about oral health and composes the influence of oral diseases on society into seven domains functional limitations, physical pain, psychological discomfort, decreased physical ability, decreased mental ability, decreased social skills, and social disorder into 14 items and it is measured in a five point Likert scale where higher total score denotes higher Oral health-related quality of life. Cronbach's  $\alpha$  that represents internal consistency of the research tools was 0.90.

Oral health-related ADL<sup>12</sup> used modified and supplemented survey that is used in oral health services and it was composed of six items including 'perceived oral diseases', 'difficulties chewing', 'oral pain', 'gingiva bleeding', 'number of daily teeth brushing', and 'oral examination experience in the past year'.

Xerostomia denotes changes in the state of well-being due to dry mouth due to changes in oral tissue and the study used oral subjective symptoms score tool by Fox<sup>13</sup>. It is composed of four items 'mouth is dry when eating,' it is difficult to swallow food,' is very difficult to eat dry foods without beverages, and 'it feels like there is very little saliva in the mouth.' It is measured with 'not at all = 1,' 'sometimes = 2,' 'always = 3 points' and the range of total score is from 4 to 12 points and higher scores denotes higher level of xerostomia. Cronbach's  $\alpha$  of the survey questions about xerostomia was 0.87.

#### 2.5 Statistics Analysis

IBM SPSS Statistics 21.0 was used for Independent t-test and One-way Analysis of Variance (ANOVA) test on number of existing teeth by general characteristics, DMFT index, and OHRQoL then post examination was conducted using Duncan's multiple analysis. Chi-square and Fisher' exact test were conducted for relation between age and oral health related Activities of Daily Living and related factors that influence OHRQoL was analyzed using stepwise multiple regression.

#### 3. Results

# 3.1 The Number of Natural Teeth, DMFT and OHRQoL in the Elderly

Table 1 is the result of analysis of number of natural teeth in the subjects, number of DMFT, and OHRQoL level. The number of natural teeth in the subjects was 12.0 and DMFT was found to be 15.8. OHRQoL had the maximum score of 70 and average of 52.2.

## 3.2 Differences in OHRQoL according to General Characteristics

Table 2 is the result of analysis of differences in OHRQoL by general characteristics of subjects. OHRQoL was at a relatively higher level in home care compared to facilities (p<0.001), and higher levels are shown with higher perceived oral health (p<0.001).

# 3.3 Relation between Age and Oral Health Related ADL

By analyzing the relation with oral health related ADL by classifying the age of subject elderly into under 75 and over 75 (Table 4.), 71.6% was aware of their own oral diseases, and 'over 75 (58.1%)' showed higher level than 'under 75 (75.3%)' (p<0.001). 51.6% had masticatory discomfort,

**Table 1.** The level of natural teeth, DMFT and OHRQoL

Characteristics	N	Possible range	Min	Max	M±SD
Natural teeth	247	0-32	0	30.0	12.0±9.92
<75	46				17.8±9.63
≥75	185				10.8±9.60
DMFT Index	247	0-32	0	32.0	15.8±9.76
Xerostomia	245	1-12	1.00	12.00	6.60±2.80
OHRQoL	243	0-70	4.00	70.00	52.2±12.49

Table 2. Natural teeth and DMFT according to age

Age	N	Natural teeth	$\mathbf{P}^*$	DMFT	$\mathbf{P}^*$	Xerostomia	P*	
		M±SD		M±SD		M±SD		
<75	46	17.7±9.63	< 0.001	12.9±8.23	0.034	6.1±2.71	0.138	
≥75	185	10.8±9.60		15.9±10.02		6.8±2.88		

\*by the independent t-test at  $\alpha = 0.05$ 

**Table 3.** OHRQoL according to general characteristics

	D	N	OHRQoL	D.	
Characteristics	Division	N	M±SD	P*	
Residential type	Home	143(58.8)	55.3±9.39	< 0.001	
	Nursing home	100(41.2)	47.9±14.89		
Age(years)	<74	48(21.1)	54.6±12.77	0.142	
	≥75	179(78.9)	51.6±12.02		
Gender	Male	60(225.0)	51.9±12.93	0.827	
	Female	180(75.0)	52.3±12.46		
Living together	Family together	84(34.5)	52.0±14.58	0.843	
	Living alone	159(65.4)	52.4±11.28		
Perceived oral health	Good	61(25.2)	55.5±14.73ª	<0.001	
	Moderate	70(28.9)	56.2±8.55 <sup>b</sup>		
	Poor	111(45.9)	47.8±11.88°		
Wearing denture	Yes	83(34.2)	51.2±13.50	0.369	
	None	160(65.8)	52.8±11.94		

'by the independent t-test or the one-way ANOVA test at  $\alpha = 0.05\,$ 

**Table 4.** Relationship between age and oral health-related ADL Unit: N (%)

Character states	Division	A	ge	75 4 1	
Characteristics	Division	<75	≥75	Total	P*
Perceived oral disease	Yes	25(58.1)	119(75.3)	144(71.6)	0.035
	None	18(41.9)	39(24.7)	57(28.4)	
Masticatory difficulty	Yes	26(54.2)	89(50.9)	115(51.6)	0.746
	None	22(45.8)	86(49.1)	108(48.4)	
Oral pain	Yes	31(64.6)	131(76.6)	162(74.0)	0.098
	None	17(35.4)	40(23.4)	57(26.0)	
Gingival bleeding	Yes	32(66.7)	133(78.2)	165(75.7)	0.127
	None	16(33.3)	37(21.8)	53(24.3)	
Frequency of brushing	≥2 per day	41(85.4)	7(14.6)	180(81.8)	0.532
	<2 per day	139(80.8)	33(19.2)	40(18.2)	
Oral examination	Yes	22(45.8)	53(31.5)	75(34.7)	0.085
	None	26(54.2)	115(68.5)	141(65.3)	

 $<sup>^{\</sup>circ}$  by the chi-square test and fisher' exact test at  $\alpha{=}0.05$  ADL = Activities of Daily Living

**Table 5.** Predictors of related to oral health-related quality of life by stepwise multiple regression analysis

Independent variable	Unstandardized coefficient		Standardized coefficient	t	<b>P</b> *
variable	В	S.E.	Beta		
Constant	57.775	3.121		18.509	<0.001
Masticatory difficulty(none=0, yes=1)	-5.644	1.569	-0.239	-3.597	<0.001
Oral pain(none = 0, yes = 1)	-6.956	1.697	-0.254	-4.100	<0.001
Residential type(Home = 0, Nursing home = 1)	-6.912	1.447	-0.286	-4.776	<0.001
Perceived oral health	1.913	0.752	0.165	2.545	0.012
Frequency of tooth brushing(≥2 per day = 0, <2 per day = 1)	-4.944	1.802	-0.165	-2.744	0.007
Perceived health	1.538	0.645	0.147	2.382	0.018

Dependent variable = OHIP-14, \*by the stepwise multiple regression analysis

 $R^2 = 0.380$ , Adjusted  $R^2 = 0.359$ , F = 18.673(p<0.001)

74.0% had oral pain, and 75.7% had gingival bleeding symptoms. 34.7% had experience of oral examinations in the past year and it was 31.5% for 'over 75.'

# 3.4 Related Factors that Influence OHRQoL in the Elderly

In the result of stepwise multiple regression analysis with independent variables age, residential form, number of natural teeth, DMFT, oral health related ADL, xerostomia, perceived oral health, and perceived health to figure out the related factors that influence OHRQoL in the subject elderly (Table 4.), it was found that masticatory ability, oral pain, perceived oral health, daily number of teeth brushing, and higher perceived health where doctors that had significant influences. Thus OHRQoL was higher with better masticatory ability ( $\beta = -0.286$ , p<0.001), less oral pain ( $\beta = -0.254$ , p<0.001), better perceived oral health  $(\beta = 0.165, P = 0.012)$ , twice or more daily number of teeth brushing ( $\beta = -0.165$ , p = 0.007), and higher perceived health ( $\beta = 0.147$ , p = 0.018). Also for elderly in facilities, it was found that their level of OHRQoL was low  $(\beta = -286, p < 0.001)$ . The adjusted explanatory power of this model was found to be 35.9%.

 $<sup>^{\</sup>text{a, b, c}}$  means followed by different letters are significantly different at  $\alpha=0.05$ 

#### 4. Discussion

With the rapid rise of the elderly population the underlying severities about health problems are slowly emerging<sup>14</sup>. Because it is known that oral health is closely related to whole body health and that it acts as a determinant of quality of life<sup>15,16</sup>, the importance of oral health is more and more emphasized in the process of reviewing health problems<sup>17</sup>.

In this study OHRQoL showed a score of 52.2 out of 70 and because OHRQoL score was higher with better subjective oral health perception, it matched the study results by Choi et al<sup>18</sup>. In addition considering that elderly with dentures showed lower levels compared to elderly without dentures, it is considered that with higher confidence about their own health and higher number of natural teeth oral health related satisfaction increased.

Xerostomia showed 6.60 points out of a maximum of 12 points which was lower than 7.87 reported by Jang et al. <sup>19</sup> but this is determined that it is due to the fact that the subject in the study were all elderly with dentures and in this study 34.2% of the subjects had dentures. Matear et al. <sup>20</sup> reported that there was relation between xerostomia and OHRQoL (OR = 2.55), but in this study there was no statistically significant relation.

Health promotion behavior of elderly can be acquired through healthy lifestyle by increasing the level of adaptation to health rather than removing a specific threat to health<sup>21</sup>. In the result of the investigation of existence of perception of their own oral diseases, existence of masticatory discomfort, existence of oral pain, existence of gingival bleeding, number of daily teeth brushing, and whether they had oral health examination within the past year in the study to figure out the Oral health-related ADL of the elderly, the awareness level about their own oral diseases was 71.6% and it was a very poor level where there were symptoms such as gingival bleeding (75.7%), oral pain (74.0%), and masticatory discomfort (51.6%). Although it was an encouraging phenomenon that daily number of teeth brushing was 81.8% twice or more, existence of oral health examination in the past year was at a very low level with 34.7%. Therefore, periodical oral examination services should be expanded and conducted within the elderly oral health improvement business so that the elderly will accurately perceive their oral health and so that they will voluntarily actively participate in their oral management.

After examining the results that show significant relation with masticatory discomfort, oral pain, residential

form, perceived oral health, number of daily teeth brushing, and perceived health in the related factors that influence OHRQoL in the elderly, the direction of elderly visiting oral healthcare business should recommend prioritizing elderly household oral hygiene management, and conduct comprehensive oral care with emphasis on low income or elderly people living alone to ultimately take the active role in pursuing quality of life and happiness. Kang et al.9 stated that for visiting oral health business to be activated there needs to be funding, establishment of legal basis and administrative systems, and suggestion of realistic business direction. Therefore in addition to strong administrative and institutional foundation there needs to be design of practical visiting oral health business for the elderly and development of new related indicators that can feasibly assess elderly oral health levels.

The significance of the study is in that visiting oral health care subject elderly people's oral health levels were actually measured and correlation of the related indicators were analyzed to provide basic data in developing elderly oral healthcare business program. However because the study selected visiting oral healthcare subject elderly that live in some areas there is limitations in generalizing the study results nationwide. In the future the subjects should be expanded by region and residence based on this study result and study that includes indicators that can be reflected on actual visiting oral health program for the elderly should be conducted.

Examining the above results, the level of oral health related ADL in visiting oral healthcare subject elderly was very low. To promote OHRQoL, it is suggested that there is need for strategy to increase oral function and oral health related ADL in the elderly and especially special management about elderly people in facilities.

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