

Analysis of Oral Health Status for the Elderly

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I . Introduction

1. Need

According to a report of the Korea Institute for Health and Social Affairs, Koreans take the importance of oral health as more seriously as they get older, and 64.5% of the population aged over 60 considers oral health problems to be more important than any other health problems. These data mean that it is difficult for a large number of elderly to meet even the most basic desire of maintaining a healthy life because many of their teeth were already missed or they have

oral diseases. Especially, the lack of nutrition and the lowering the quality of daily life quality due to missing teeth are clearly found among the elderly who have relatively low economic ability and take a negative attitude toward treating oral diseases. As a part of health, oral health is closely related with nutrition and digestion (Won Yeong Soon 2003). Especially, oral hygiene is essential in the geriatric health index(Lomax 1987).

Meanwhile, discussions on the relationship between oral health and systematic health began from the early 1980s in the western countries, with many related findings being reported in the 1990s (Choi

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Yeon Hee 2001).

Harris and Garcia-Godoy(1999) reported that 90.0% of the elderly aged over 65 needed periodontal treatment and 15.0% needed complex treatment. Gift et al.(1991) reported that the elderly aged 65~74 without teeth had more oral problems than older or younger people. According to Agerberg and Carlsson(1981), chewing ability is closely related to the number of teeth. Thus, it seems that people with teeth less than 7 teeth have more serious problems in chewing than people wearing a denture. Also, the number of remaining teeth of an old person is different from that of a young person, and there is a report that the missing rate of molar teeth is increasing(Lindhe et al. 1989).

Oral disease usually occurs progressively and the process of aging may directly or indirectly increase the risk of missing teeth with general diseases or chronic diseases. On the other hand, it may increase the risk of general health, weaken the ability of chewing and digesting, and affect nutrition. Likewise, systematic diseases and side effects of the treatment may increase the risk of oral disease, decrease of saliva flow, change the sense of tasting and hearing, facial pain, excess of gingiva exposure, reabsorption of alveolar bone, and tooth mobility. In addition, many medicines may aggravate the effect on oral disease. For other related problems, food containing a high rate of sugar, inappropriate

oral hygiene from dull hands, drinking, and smoking may be harmful factors to oral health(WHO, 2003).

2. Object

This study aimed to contribute to oral health improvement of the elderly by investigating the oral health status of the elderly aged over 65 and by providing basic data for improving the quality of geriatric oral health.

The concrete objects of this study were as follows:

First, grasp oral health behaviors according to the general characteristics of the elderly.

Second, grasp and analyze the oral health status of the elderly.

II. Methods

1. Subjects

Study subjects were 9340 elderly aged over 65 who had taken a health examination (the first) for the local insured when the National Health Insurance Corporation carried out in its survey area from January to December, 2002. Considering the location and the scale of population, firstly, big unit areas(metropolitan city, province) were selected according to convenience, and secondly, small unit areas(city, county,

district) were selected randomly. In this study we divided these administrative districts into three categories, big city(metropolis), medium(urban), and rural area. The Gu's of Seoul and three other metropolitan cities(Busan, Daegu and Kwangju) were categorized as big city and 4 subjects included. The 5 Si's(Wonju, Gimchun, Mokpo, Junju and Gongju) were categorized as medium and 5 Gun's(Yeongduk, Namjeju, Inje, Yesan and Jangsu) were categorized as rural.

The subjects were the elderly who took an oral examination and filled in the questionnaire.

2. Method and Contents of Analysis

Analyzed contents included eating habits (sweet food, tough and hard food, snack), treatment, prevention(visiting a dentist, oral prophylaxis, toothbrushing), oral symptoms (tooth sensitivity to cold, tooth sensitivity to toothbrushing, gingival bleeding, temporomandibular joint sound, temporomandibular joint pain, halitosis. tooth breaking), and oral health status(caries, missing teeth, periodontal disease, dental abrasion), which were covered in the oral examination questionnaire that the National Health Insurance Corporation had developed, and a notice of oral examination analysis results. Collected data were analyzed through individual coding and modifying, using SPSS

WIN 10.0 and AMOS 4.0.

To determine the oral health status of the subjects and the general characteristics, and to understand prevention, treatment, oral symptoms, eating habits, toothbrushing habits, and oral disease, χ^2 analysis was carried out for caries, missing teeth, periodontal disease, dental abrasion, gingivostomatitis, temporomandibular joint condition, and denture status.

III. Results

1. Analysis of Oral Health Behavior

1) Oral Health Behavior

For the experiences of visiting a hospital (clinic) within the last one year, 38.2% of total subjects had visited a hospital (clinic). By area, visiting a hospital (clinic) was most common in big cities was at 48.3% followed by medium cities at 43.9%, and rural areas at 29.0% . City areas showed a higher rate than rural areas($p<0.001$).

For the experiences of oral prophylaxis, 12.3% of total subjects had experienced of oral prophylaxis. By area, the rate was 16.0% in big cities and rural areas were 6.4% in rural areas, cities having a higher rate of experience of oral prophylaxis($p<0.001$).

For the daily frequency of toothbrushing, "twice" was 47.5% 'once' 26.7%, 'more than two times' 25.0%, and 'none' 0.7%, Brushing

'none' (0.3%) or 'once' a day, was higher in rural areas than in big cities or medium cities(p<0.001).

For the method of toothbrushing, 61.7% of total subjects brushed teeth 'up and down'

and city residents tended to prefer this method to others. By age, the younger age had a higher rate of brushing 'up and down' (p<0.001) (Table 1).

Table 1. Oral Health Behavior person(%)

Classification		Total	visiting a dentist		Total	oral prophylaxis	
			Have	Have Not		Have	Have Not
Area	big city	2532	1222(48.3)	1310(51.7)	2533	475(18.8)	2058(81.2)
	medium	2463	1082(43.9)	1381(56.1)	2469	394(16.0)	2075(84.0)
	rural	4250	1231(29.0)	3019(71.0)	4249	272(6.4)	3977(93.6)
	χ^2		296.281***			264.800***	
Sex	male	4518	1884(41.7)	2634(58.3)	4522	667(14.8)	3855(85.2)
	female	4727	1651(34.9)	3076(65.1)	4729	474(10.0)	4225(90.0)
	χ^2		44.870***			47.767***	
Age	65~69	2522	1070(42.4)	1452(57.6)	2517	385(15.3)	2132(84.7)
	70~79	5671	2196(38.7)	3475(61.3)	5677	681(12.0)	4996(88.0)
	80~	1052	269(25.6)	783(74.4)	1057	75(7.1)	982(92.9)
	χ^2		90.784***			47.849***	
Total		9245	3535(38.2)	5710(61.8)	9251	1141(12.3)	8110(87.7)

Classification		Total	Toothbrushing Frequency(a day)				Total	Toothbrushing Method	
			none	1	2	3		horizontally	vertically
Area	big city	2606	26(1.0)	612(23.5)	1223(46.9)	745(28.6)	2482	717(28.9)	1765(71.1)
	medium	2475	30(1.2)	493(19.9)	1192(48.2)	760(30.7)	2457	853(34.7)	1604(65.3)
	rural	4259	14(0.3)	1390(32.6)	2024(47.5)	831(19.5)	4225	1939(45.9)	2286(54.1)
	χ^2		225.496***					209.500***	
Sex	male	4572	38(0.8)	1415(30.9)	1957(42.8)	1162(25.4)	4475	1672(37.4)	2803(62.6)
	female	4768	32(0.7)	1080(22.7)	2482(52.1)	1174(24.6)	4689	1837(39.2)	2852(60.8)
	χ^2		103.580***					3.188	
Age	65~69	2542	16(0.6)	604(23.8)	1289(50.7)	633(24.9)	2501	893(35.7)	1608(64.3)
	70~79	5736	44(0.8)	1522(26.5)	2719(47.4)	1451(25.3)	5626	2197(39.1)	3429(60.9)
	80~	1062	10(0.9)	369(34.7)	431(40.6)	252(23.7)	1037	419(40.4)	618(59.6)
	χ^2		52.151***					10.410**	
Total		9340	70(0.7)	2495(26.7)	4439(47.5)	2336(25.0)	9164	3509(38.3)	5655(61.7)

* : p<0.05, ** : p<0.01, *** : p<0.001

2) Eating Habits

For eating habits, rural residents disliked all sweet food, tough and hard food, and snacks more than city residents($p<0.001$) and women disliked them more than men ($p<0.01$).

By age, the older age tended to dislike 'tough and hard food' ($p<0.001$)(Table 2).

3) Oral Symptoms

For oral symptoms, city residents had greater tooth sensitivity to cold, tooth sensitivity to toothbrushing,

temporomandibular joint sound, and temporomandibular joint pain($p<0.001$), and women had greater tooth sensitivity to cold and tooth sensitivity to toothbrushing(28.2%, 19.1%) than men (25.9%, 15.6%)($p<0.005$).

For age, the younger age showed a higher rate of tooth sensitivity (Table 3).

For gingival bleeding and halitosis, city residents had a higher rate of symptoms ($p<0.001$) and the younger age had a higher rate of gingival bleeding and halitosis ($p<0.001$).

Table 2. Eating Habits person(%)

Classification	Total	Sweet Food			Total	Tough & Hard Food			Total	Snack		
		like	not like	ordinary		like	not like	ordinary		like	not like	ordinary
Area												
big city	2,568	448 (17.4)	1,031 (40.1)	1,089 (42.4)	2,545	345 (13.6)	1,163 (45.7)	1,037 (40.7)	2,544	470 (18.5)	929 (36.5)	1,145 (45.0)
medium city	2,473	530 (21.4)	1,133 (45.8)	810 (32.8)	2,467	353 (14.3)	1,426 (57.8)	688 (27.9)	2,462	500 (20.3)	1,105 (44.9)	857 (34.8)
rural	4,256	990 (23.3)	2,115 (49.7)	1,151 (27.0)	4,252	486 (11.4)	2,803 (65.9)	963 (22.6)	4,251	801 (18.8)	2,065 (48.6)	1,385 (32.6)
χ^2		172.668***				304.951***				125.170***		
Sex												
male	4,543	1061 (23.4)	1,859 (40.9)	1,623 (35.7)	4,525	625 (13.8)	2,470 (54.6)	1,430 (31.6)	4,526	906 (20.0)	1,926 (42.6)	1,694 (37.4)
female	4,754	907 (19.1)	2,420 (50.9)	1,427 (30.0)	4,739	559 (11.8)	2,922 (61.7)	1,258 (26.5)	4,731	865 (18.3)	2,173 (45.9)	1,693 (35.8)
χ^2		93.456***				47.657***				11.299**		
Age												
65-69	2,533	500 (19.7)	1,157 (45.7)	876 (34.6)	2,523	357 (14.1)	1,379 (54.7)	787 (31.2)	2,526	487 (19.3)	1,098 (43.5)	941 (37.3)
70-79	5,706	1226 (21.5)	2,656 (46.5)	1,824 (32.0)	5,687	743 (13.1)	3,331 (58.6)	1,613 (28.4)	5,681	1097 (19.3)	2,540 (44.7)	2,044 (36.0)
80	1,058	242 (22.9)	466 (44.0)	350 (33.1)	1,054	84 (8.0)	682 (64.7)	288 (27.3)	1,050	187 (17.8)	461 (43.9)	402 (38.3)
χ^2		9.164				42.386***				3.437		
Total	9,297	1,968 (21.2)	4,279 (46.0)	3,050 (32.8)	9,264	1,184 (12.8)	5,392 (58.2)	2,688 (29.0)	9,257	1,771 (19.1)	4,099 (44.3)	3,387 (36.6)

** : $p<0.01$, *** : $p<0.001$

Table 3. Oral Symptom person(%)

Classification		Total	sensitivity to cold food		sensitivity to toothbrushing		gingival bleeding	
			Have	Have Not	Have	Have Not	Have	Have Not
Area	big city	2606	819(31.4)	1787(68.6)	521(20.0)	2085(80.0)	465(17.8)	2141(82.2)
	medium	2475	696(28.1)	1779(71.9)	427(17.3)	2048(82.7)	321(13.0)	2154(87.0)
	rural	4259	1016(23.9)	3243(76.1)	678(15.9)	3581(84.1)	422(9.9)	3837(90.1)
χ^2			48.707***		18.712***		90.403***	
Sex	male	4572	1185(25.9)	3387(74.1)	714(15.6)	3858(84.4)	537(11.7)	4035(88.3)
	female	4768	1346(28.2)	3422(71.8)	912(19.1)	3856(80.9)	671(14.1)	4097(85.9)
	χ^2		6.311*		20.007***		11.229**	
Age	65~69	2542	798(31.4)	1774(68.6)	525(20.7)	2017(79.3)	372(14.6)	2170(85.4)
	70~79	5736	1551(27.0)	4185(73.0)	984(17.2)	4752(82.8)	747(13.0)	4989(87.0)
	80~	1062	182(17.1)	880(82.9)	117(11.0)	945(89.0)	89(8.4)	973(91.6)
χ^2			77.007***		49.042***		26.120***	
Total		9340	2531(27.1)	6809(72.9)	1626(17.4)	7714(82.6)	1208(12.9)	8132(87.1)

Classification		Total	halitosis		temporomandibular joint sound		temporomandibular joint pain	
			Have	Have Not	Have	Have Not	Have	Have Not
Area	big city	2606	652(25.0)	1954(75.0)	182(7.0)	2424(93.0)	163(6.3)	2443(93.7)
	medium	2475	573(23.2)	1902(76.8)	97(3.9)	2378(96.1)	82(3.3)	2393(96.7)
	rural	4259	600(14.1)	3659(85.9)	83(1.9)	4176(98.1)	79(1.9)	4180(98.1)
χ^2			150.825***		110.034***		93.712***	
Sex	male	4572	922(20.2)	3650(79.8)	178(3.9)	4394(96.1)	158(3.5)	4414(96.5)
	female	4768	903(18.9)	3865(81.1)	184(3.9)	4584(96.1)	166(3.5)	4602(96.5)
	χ^2		2.237		0.007		0.005	
Age	65~69	2542	538(21.2)	2004(78.8)	122(4.8)	2420(95.2)	98(3.9)	2444(96.1)
	70~79	5736	1123(19.6)	4613(80.4)	202(3.5)	5534(96.5)	189(3.3)	5547(96.7)
	80~	1062	164(15.4)	898(84.6)	38(3.6)	1024(96.4)	37(3.5)	1025(96.5)
χ^2			15.613***		8.004*		1.652	
Total		9340	1825(19.5)	7515(80.5)	362(3.9)	8978(96.1)	324(3.5)	9016(96.5)

* : p<0.05, ** : p<0.01, *** : p<0.001

2. Analysis of Oral Health Status

1) Caries

The rate of caries was 10.6% with rural areas having a higher rate than cities (p<0.001), and men than women (p<0.001).

By age, many of the elderly aged over 80 had more than 2 caries (Table 4).

2) Missing Teeth

For missing teeth, rural areas had a higher

rate than cities and especially, for more than 11 missing teeth($p<0.001$).

Men had a higher rate of total missing teeth(40.7%) rate than women (36.5%), but for more than 11 missing teeth, women (11.3%) had a higher rate than men (9.2%) ($p<0.001$).

By age, the older age had a higher rate of missing teeth and especially, the rate of more than 11 missing teeth was high ($p<0.001$)(Table 5).

3) Periodontal Disease

The rate of periodontal disease was 43.2%. By area, big cities (46.2%) had a higher rate than medium cities(39.4%) and rural areas(43.6%), while men (46.4%) had a higher rate than women (40.2%) ($p<0.001$).

By age, the younger age had a higher rate ($p<0.001$) (Table 6).

4) Dental Abrasion

The rate of observed dental abrasion was

Table 4. Dental Caries person(%)

Classification		Total	None	1	2	χ^2
Area	big city	2,606	2,392(91.8)	123(4.7)	91(3.5)	53.615***
	medium	2,475	2,256(91.2)	105(4.2)	114(4.6)	
	rural	4,259	3,704(87.0)	286(6.7)	269(6.3)	
Sex	male	4,572	4,024(88.0)	272(5.9)	276(6.0)	21.548***
	female	4,768	4,328(90.8)	242(5.1)	198(4.2)	
Age	65~69	2,542	2,275(89.5)	146(5.7)	121(4.8)	16.430**
	70~79	5,736	5,144(89.7)	319(5.6)	273(4.8)	
	80~	1,062	933(87.9)	49(4.6)	80(7.5)	
Total		9,340	8,352(89.4)	514(5.5)	474(5.1)	

** : $p<0.01$, *** : $p<0.001$

Table 5. Missing Teeth person(%)

Classification		Total	Missing Teeth			χ^2
			None	>10	11<	
Area	big city	2,606	1,838(70.5)	614(23.6)	154(5.9)	310.840***
	medium	2,475	1,614(65.2)	711(28.7)	150(6.1)	
	rural	4,259	2,290(53.8)	1,315(30.9)	654(15.4)	
Sex	male	4,572	2,712(59.3)	1,440(31.5)	420(9.2)	49.873***
	female	4,768	3,030(63.5)	1,200(25.2)	538(11.3)	
Age	65~69	2,542	1,606(63.2)	770(30.3)	166(6.5)	137.608***
	70~79	5,736	3,514(61.3)	1,634(28.5)	588(10.3)	
	80~	1,062	622(58.6)	236(22.2)	204(19.2)	
Total		9,340	5,742(61.5)	2,640(28.3)	958(10.3)	

*** : $p<0.001$

Table 6. Periodontal Disease person(%)

Classification		Total	Have	Have Not	χ^2
Area	big city	2,606	1,205(46.2)	1,401(53.8)	24.669***
	medium	2,475	975(39.4)	1,500(60.6)	
	rural	4,259	1,856(43.6)	2,403(56.4)	
Sex	male	4,572	2,121(46.4)	2,451(53.6)	36.886***
	female	4,768	1,915(40.2)	2,853(59.8)	
Age	65~69	2,542	1,265(49.8)	1,277(50.2)	125.380***
	70~79	5,736	2,457(42.8)	3,279(57.2)	
	80~	1,062	314(29.6)	748(70.4)	
Total		9,340	4,036(43.2)	5,304(56.8)	

*** : $p < 0.001$

Table 7. Dental Abrasion person(%)

Classification		Total	Have	Have Not	χ^2
Area	big city	2,606	551(21.1)	2,055(78.9)	135.034***
	medium	2,475	520(21.0)	1,955(79.0)	
	rural	4,259	512(12.0)	3,747(88.0)	
Sex	male	4,572	974(21.3)	3,598(78.7)	120.672***
	female	4,768	609(12.8)	4,159(87.2)	
Age	65 69	2,542	484(18.9)	2,061(81.1)	25.830***
	70 79	5,736	975(17.0)	4,761(83.0)	
	80	1,062	127(12.0)	935(88.0)	
Total		9,340	1,583(16.9)	7,757(83.1)	

*** : $p < 0.001$

16.9% and cities (21.0%) had a higher rate than rural areas(12.0%), and men(21.3%) than women(12.8%)($p < 0.001$).

Also by age, the younger age had a higher rate($p < 0.001$)(Table 7).

5) Gingivostomatitis

Symptoms of gingivostomatitis were observed in 0.5% of total subjects and there was no difference between areas, genders, or ages (Table 8).

6) Temporomandibular Joint Condition

Temporomandibular joint condition was observed in 0.2% of total subjects and there was no difference between areas, genders, or ages (Table 9).

7) Denture Status

For denture status, 48.5% of subjects needed a denture and rural areas(20.9%) had a higher rate than big cities(7.0%) and medium cities(10.5%)($p < 0.001$).

For wearing a denture now, rural areas(41.8%) had a higher rate than big cities (27.7%) and medium cities(28.2%)($p<0.001$) (Table 10).

Table 8. Gingivostomatitis person(%)

Classification		Total	Have	Have Not	χ^2
Area	big city	2,606	13(0.5)	2,593(99.5)	0.594
	medium	2,475	10(0.4)	2,465(99.6)	
	rural	4,259	23(0.5)	4,236(99.5)	
Sex	male	4,572	21(0.5)	4,551(99.5)	0.201
	female	4,768	25(0.5)	4,743(99.5)	
Age	65~69	2,542	10(0.4)	2,532(99.6)	1.131
	70~79	5,736	29(0.5)	5,709(99.5)	
	80~	1,062	7(0.7)	1,055(99.3)	
Total		9,340	46(0.5)	9,294(99.5)	

Table 9. Temporomandibular Joint Condition person(%)

Classification		Total	Have	Have Not	χ^2
Area	big city	2,606	7(0.3)	2,599(99.7)	2.629
	medium	2,475	8(0.3)	2,467(99.7)	
	rural	4,259	6(0.1)	4,253(99.9)	
Sex	male	4,572	8(0.2)	4,564(99.8)	0.993
	female	4,768	13(0.3)	4,755(99.7)	
Age	65~69	2,542	5(0.2)	2,537(99.8)	0.247
	70~79	5,736	14(0.2)	5,722(99.8)	
	80~	1,062	2(0.2)	1,060(99.8)	
Total		9,340	21(0.2)	9,319(99.8)	

Table 10. Denture Status person(%)

Classification		Total	now have not need not	now have not need	now have need not	now have need	χ^2
Area	big city	2,606	1,618(62.1)	183(7.0)	721(27.7)	84(3.2)	751.224***
	medium	2,475	1,489(60.2)	260(10.5)	698(28.2)	28(1.1)	
	rural	4,259	1,573(36.9)	891(20.9)	1,779(41.8)	16(0.4)	
Sex	male	4,572	2,455(53.7)	693(15.2)	1,351(29.5)	73(1.6)	88.716***
	female	4,768	2,225(46.7)	641(13.4)	1,847(38.7)	55(1.2)	
Age	65 69	2,542	1,552(61.1)	295(11.6)	653(25.7)	42(1.7)	331.162***
	70 79	5,736	2,812(49.0)	794(13.8)	2,051(35.8)	79(1.4)	
	80	1,062	316(29.8)	245(23.1)	494(46.5)	7(0.7)	
Total		9,340	4,680(50.1)	1,334(14.3)	3,198(34.2)	128(1.4)	

*** : $p<0.001$

IV. Discussion

By analyzing hospital(clinic) visits in the last one year, only 38.2% of subjects had visited a dentist. The rate was lower among the elderly in rural areas (29.0%) than in cities (48.3%-43.9%), but higher in the younger age and among men than women. These rates were higher than those by Geun et al. (27.4% for the elderly aged 65-74 27.4%, and 24.6% for the elderly aged over 75 24.6%) and by the Korea Institute of Oral Health Services(2001), but were lower than those dentist of American elderly(54%) (Clemencia et al., 2003).

To the extent that the object of visiting a dentist lies in improving oral health and preventing and treating oral health related diseases, oral health education needs to recognize the necessity for raising the interest in geriatric oral health and oral health care.

In this study, only 12.3% of subject elderly had experienced oral prophylaxis, the rate was much higher in and big cities(16.0%), than in rural areas(6,4%). The rate was lower than the 26.4% for the elderly in Jeongbuk area(Park et al 1999).

(Son et al. 1996) stated clarified that 76.9% of the elderly aged over 65 in Pusan needed oral prophylaxis. Therefore, it was found that most Korean elderly did not remove dental calculus.

Because the object of toothbrushing is to remove the remnants including sugar on the surface of teeth, it is desirable to remove the remnants immediately after dinner and it is important to use the right method of toothbrushing. Most subjects of this study brush their teeth after dinner. For the number of toothbrushing, the largest number of elderly answered 'twice'(47.5%), which was consistent with the report of(Park 2000), and (Abegg et al.2000). (Harry and O'Neil 1984) considered not brushing teeth(64.5%) as the most important causes of caries, followed by eating sweets and candies(58%). Meanwhile, the rate of using the right method of toothbrushing was lower for the elderly in rural areas. So, they should be encouraged to learn the right method of toothbrushing through oral health education for the elderly by a district public health center in rural areas. The American Dental Association recommend at least one toothbrushing and dental floss a day and visiting a dentist regularly (Boehmer et al 1999). Therefore, the system to support the elderly to recognize the importance of oral health and practice it in daily life, should be implemented.

The elderly often develop oral infection due to a decrease of physical strength and systematic health and develop halitosis by nasty Xerostomia(Lee 2002). The rate of halitosis was 0.5% and there was a difference between areas, genders, and ages.

(Tonezetich 1977) noted that halitosis was mainly caused by host ingredients and food remnants in the mouth becoming rotten by bacteria and that more than 85% of cases are from causes in the mouth. (Rosenberg 1996) noted that causes in the mouth included tongue coating, periodontal disease, unsanitary oral hygiene, food remnants, improper prosthetic components, unhygienic denture, and oral cancer. But now tongue coating and periodontal disease are mentioned as the most important causes.

(Miyasake et al 1995) stated that halitosis was significantly related to periodontal disease and tongue coating through an oral examination on the general public, and reported that among the youth was mainly tongue coating but the causes of halitosis among the old was periodontal disease and tongue coating.

The most important cause of missing teeth is caries (Baelum et al. 1997; Tanni 1998). Caries is known for the pathological process by which dental tissues are damaged, but the pre-development stage has not been identified clearly. Thus, prevention is preferable to treatment. The methods of prevention include removing host factors, removing pathogenic organ factors, and removing environmental factors. The handiest methods are toothbrushing, fluoride coating, and fluoride drinking (Kim 2000). In this study, 10.6% of total subjects had caries, and the elderly in

rural areas had a much higher rate of experience of caries than the elderly in cities, and men than women. This is in agreement with the results of the present study in which compared to the elderly in cities, the elderly in rural areas had fewer visits to a dentist, lower frequency of toothbrushing, and wrong habits of toothbrushing. (Clemencia et al 2003) found that one third of the elderly aged over 65 with teeth had more than one caries untreated, and the rate was higher among elderly men (35%) than among elderly women (27%); a finding which supports the results of this study. These results were closely related with usual oral health behaviors such as the frequency and method of toothbrushing. Thus it is thought that early education is needed in order to improve practice in daily life.

Missing teeth were observed in 38.6% of subjects in this study, and rural areas and men had a higher rate. According to (Petersen et al 2000), almost all of people aged from 35 to 45 had natural teeth, while 14% of people aged from 65 to 74 had no teeth and 36% of the elderly with teeth had poor teeth. (Son et al 1996) found that for the average number of existing permanent teeth of the elderly aged over 65 in the low income brackets of big cities, was people over 65 had 10.9 teeth, with 5.4 being sound teeth about half of the 28 teeth except for the a wisdom teeth being missing being missed, and about half of the

remaining teeth poor, This finding supports the results of this study.

For denture status by age, 48.5% of subjects needed a denture and the rate in rural areas (29.9%) was high more than two times than in cities. For the rate of denture wearing, rural areas (41.8%) had a higher rate than cities.

According to (Michelle et al. 2001), the level of nutrition of people wearing a denture was 20% lower than that of people with healthy teeth. Thus, nutritive conditions affect the development and progress of oral disease, and these interactions are important especially important for the elderly because these defects limit food selection even for people wearing a well- fitting denture. It is found that people with a complete denture eat less fruits and vegetables than people with complete teeth or partial teeth (Joshipura et al. 1996). Therefore the development of a standardized menu is needed would need for in order that people wearing a denture to maintain easily may take a balanced nutrition easily.

The limitation of data used in this paper is that calibration training over dentists was not done because those data were collected from National Health Insurance Corporation.

V. Conclusion

This study aimed to analyze oral health status of the elderly. Study subjects were 9,340 elderly aged over 65 who took the health examination (the first) for the local insured when the National Health Insurance Corporation carried out its survey from January to December, 2002. The subjects took an oral examination and filled in the questionnaire.

Major results from the analysis are as follows:

1. Analysis of Oral Health Behavior

For oral health behavior, 38.2% of total subjects had visited a dental hospital (or clinic) the of big cities (48.3%), medium cities (43.9%), and rural areas (29.0%) ($P<0.001$). For experience of oral prophylaxis, 12.3% of the total elderly had experienced it in the order of big cities (18.8%), medium cities (16.0%), and rural areas (6.4%) ($P<0.001$). The number of toothbrushing in order was twice (47.5%), once (26.7%), three times (25.0%), and none (0.7%) in order. The younger age brushed their teeth more often ($P<0.001$).

2. Analysis of Oral Health Status

The rate of caries was 10.6% of the elderly surveyed. For missing teeth, rural areas had a higher rate of missing teeth than cities ($p<0.001$) and 43.2% of the total elderly

had periodontal disease. By area, big cities(46.2%) had a higher rate of periodontal disease than medium cities (39.4%) and rural areas (43.6%)($p<0.001$). Dental abrasion was observed in 16.9% of the total elderly, the rate in cities(21.0%) being higher than in rural areas (12.0%)($p<0.001$). For needing a denture, the rate was 48.5%, and was higher for rural areas, the rate of people needing a denture was (20.9%) being higher than big cities (7.0%) and medium cities (10.5%)($p<0.001$). For the rate of denture wearing, rural areas(41.8%) were higher than big cities (27.7%) and medium cities (28.2%)($p<0.001$).

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ABSTRACT

This study aims to analyze the oral health status of the elderly. Study subjects were 9,340 elderly aged over 65 who took the health examination (the first) for the local insured when the National Health Insurance Corporation carried out its survey from January to December, 2002. The subjects took an oral examination and filled in the questionnaire.

Major results from the analysis are as follows:

1. Analysis of Oral Health Behavior

For oral health behavior, 38.2% of total subjects had visited a dental hospital (or clinic) in the last one year in the order of the elderly of big cities (48.3%), the elderly of medium cities (43.9%), and the elderly of rural areas (29.0%)($P<0.001$). Elderly men had a higher rate than elderly women, and the younger age had a higher rate($P<0.01$). For experience of oral prophylaxis, 12.3% of the total elderly had experienced it in the order of the elderly of big cities (18.8%), the elderly of medium cities (16.0%), and the elderly of rural areas (6.4%) ($P<0.001$). For elderly men, the younger age had a higher rate of oral prophylaxis. The number of toothbrushing in order was twice(47.5%), once (26.7%), three times (25.0%), and none (0.7%). The younger age brushed their teeth more often ($P<0.001$).

2. Analysis of Oral Health Status

The rate of caries was 10.6% of the elderly surveyed. By area, the elderly of rural areas had a higher rate of caries than the elderly of cities ($p<0.001$) and elderly men were higher than elderly women ($p<0.001$). By age, many elderly aged over 80 had more than two caries.

For missing teeth, the elderly of rural areas had a higher rate than the elderly of cities ($p<0.001$) and the older age had a higher rate($p<0.001$).

The rate of periodontal disease was 43.2% of the total elderly. By area, the elderly of big cities (46.2%) had a higher rate of periodontal disease than the elderly of medium cities (39.4%) and rural areas (43.6%)($p<0.001$), and elderly men (46.4%) were higher than elderly women (40.2%)($p<0.001$). By age, the lower age had a higher rate of periodontal disease ($p<0.001$).

Dental abrasion was observed in 16.9% of the total elderly. The elderly of cities (21.0%) had a higher rate than the elderly of rural areas (12.0%)($p<0.001$) and elderly men (21.3%) were higher than elderly women (12.8%)($p<0.001$). Also the lower age had more dental abrasion symptoms ($p<0.001$).

For needing a denture, the rate among the elderly was 48.5% and was higher for the elderly of rural areas(20.9%), than the elderly of big cities(7.0%) and medium cities (10.5%)($p<0.001$). For the rate of denture wearing, the elderly of rural areas(41.8%) were higher than the elderly of big cities (27.7%) and medium cities (28.2%)($p<0.001$).

For the relation of drinking and smoking to oral health, the elderly who had a higher frequency of drinking, had a higher rate of caries ($p<0.001$) periodontal disease($p<0.001$) and missing teeth($p<0.001$) Smokers had a higher rate of caries ($p<0.001$), periodontal disease ($p<0.05$), and missing teeth ($p<0.001$) than nonsmokers.

Key Words: Oral Health Status, Oral Health Behavior, Elderly