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Differences in the Oral Health Status and Oral Hygiene Practices According to Post Stroke Sequelae

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Introduction
Oral health and hygiene are crucial parameters in stroke patients. However, few studies has evaluated the oral health status and oral hygiene practices according to the level of function in stroke patients. The aim of the present study was to evaluate the oral health status and oral hygiene practices according to ambulation and personal hygiene levels in patients with stroke.

Methods
Data from the fifth (2010-2012) and sixth (2013-2015) editions of the Korea National Health and Nutrition Examination Survey (KNHANES) for 6 years combined. 700 stroke patients were enrolled in our study. The patients' general characteristics are presented in Table 1. Table 2, 3 shows the Results of hierarchical logistic regression analysis adjusted for certain variables (age, gender, monthly household income, living arrangement, diabetes, stroke duration) that was performed to identify the effects of the ambulation level and functional independence on the oral health status and oral hygiene practices.

Results
Subjective oral health was significantly poorer in patients who experienced a moderate problem with walking [adjusted OR (AOR), 1.68; 95% CI, 1.21-2.33] and bed-bound patients (AOR, 2.92; 95% CI, 1.01-8.44) than in patients who could walk without difficulty. Patients who were unable to bathe or dress independently exhibited a significantly higher risk of dental caries than did those who could perform the same activities unassisted. The probability of brushing teeth ≥2 times daily was 69% lower in bed-bound patients (AOR, 0.31; 95% CI, 0.11-0.87) than in patients who could walk without difficulty, and 76% lower in patients who were unable to bathe or dress independently (AOR, 0.24; 95% CI, 0.09-0.62) than in those who could perform the same activities without difficulty.

Conclusion
There were differences in oral health status and oral hygiene practices, according to ambulation level and functional independence, in the stroke patient group. These Results indicate the need for oral care for stroke patients who exhibit ambulatory and functional limitations.

Table 1. General characteristics of patients with stroke

	Study subjects	
	Unweighted (n)	Weighted (%)
All	700	100.0
Sex		
Men	363	54.8
Women	337	45.2
Age (years)		
20-29	4	0.6
30-39	8	1.1
40-49	24	3.4
50-59	97	13.9
60-69	243	34.8
70+	323	46.2
Monthly household income (10,000 won)		
<100	327	45.6
≥100 - < 200	153	21.4
≥200- <300	119	16.6
≥300	96	16.4
Living arrangement		
Living with family	578	83.5
Living alone	122	16.5
Ambulation level		
No problem	358	54.6
Moderate problem	320	42.3
Unable	22	3.1
Self care		
No problem	522	74.6
Moderate problem	149	21.3
Unable	29	4.1

Table 2. Variations in the oral health status according to the level of ambulation and functional independence in patients with stroke

	Subjective oral health		Number of decayed teeth	
	Model 1	Model 2	Model 1	Model 2
	AOR (95% CI)	AOR (95% CI)	β(t)	β(t)
Ambulation level				
No problem	1.00	1.00	1.00	1.00
Moderate problem	1.68 (1.21-2.33)**	1.68 (1.21-2.33)**	0.018(0.45)	0.022(0.53)
Unable	3.59 (1.27-10.12)*	2.92 (1.01-8.44)*	0.078(1.99)	0.073(1.83)
Model test	0.679[a]	0.483[a]	2.830[b]	2.329[b]
Self care				
No problem	1.00	1.00	1.00	1.00
Moderate problem	1.58 (1.07-2.33)*	1.54 (1.04-2.27)*	0.027(0.70)	0.027(0.68)
Unable	1.25 (0.57-2.77)	1.29 (0.57-2.93)	0.157(4.08)***	0.173(4.43)***
Model test	0.912[†]	0.750[†]	5.000[‡]	4.408[‡]

*$P<0.05$, **$P<0.01$, ***$P<0.001$

AOR: adjusted odds ratio

95% CI: confidence interval

[†]Hosmer-Lemeshow test

[‡]F-test

Model 1: Adjusted for sex, age, monthly household income, and living arrangement

Model 2: Adjusted for sex, age, monthly household income, living arrangement, diabetes, and stroke duration

Table 3. Variations in oral hygiene practices linked with ambulation ability and functional independence

	Tooth brushing		Oral exam		Use of dental service	
	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)	Model 1 AOR (95% CI)	Model 2 AOR (95% CI)
Ambulation level						
No problem	1.00	1.00	1.00	1.00	1.00	1.00
Moderate problem	0.72 (0.15-1.03)	0.75 (0.45-1.22)	1.01 (0.60-1.68)	1.00 (0.59-1.68)	0.66 (0.43-1.00)	0.69 (0.45-1.06)
Unable	0.40 (0.15-1.03)	0.31 (0.11-0.87)*	0.33 (0.04-2.61)	0.34 (0.04-2.84)	0.65 (0.23-1.83)	0.47 (0.15-1.50)
Model test	0.761†	0.842†	0.433†	0.256†	0.370†	0.215†
Self care						
No problem	1.00	1.00	1.00	1.00	1.00	1.00
Moderate problem	0.72 (0.43-1.19)	0.72 (0.43-1.19)	0.97 (0.51-1.82)	0.98 (0.52-1.83)	0.98 (0.60-1.57)	1.01 (0.62-1.63)
Unable	0.23 (0.09-0.59)**	0.24 (0.09-0.62)**	0.58 (0.14-2.35)	0.35 (0.66-1.86)	0.60 (0.22-1.61)	0.71 (0.25-2.06)
Model test	0.925†	0.242†	0.873†	0.904†	0.435†	0.154†

*$P<0.05$, **$P<0.01$, ***$P<0.001$

AOR: adjusted odds ratio

95% CI: confidence interval

†Hosmer-Lemeshow test

Model 1: Adjusted for sex, age, monthly household income, and living arrangement

Model 2: Adjusted for sex, age, monthly household income, living arrangement, diabetes, and stroke duration