Impact of changes in the number of teeth on psychological disorders among community-dwelling older adults in Taipei

Ching-Fang Hsiao[1], Hsiao-Yun Hu[1,2,3], Ya-Huei Nian[1], Yi-Zhen Wu[1], Hsin-Ling Hsieh[1], Chih-Hao Tseng[1], Shih-Han Weng[1,2], Yi-Chang Chou[1,2]

[1] Department of Education and Research, Taipei City Hospital, [2] University of Taipei, [3] Institute of Public Health, National Yang Ming Chiao Tung University

Background & objective

Aging populations around the world face a significant burden of psychological disorders that impact their quality of life and overall health. It is known that oral health is associated with psychological disorders, but the impact of changes in the number of teeth on psychological disorders remains unknown. This study aimed to evaluate the impact of changes in the number of teeth on the subsequent development of psychological disorders among community-dwelling elderly in Taipei City.

Methods & intervention

From 2005 to 2016, a total of 65,518 community-dwelling individuals aged 65 years and older participated in the physical examination program in Taipei. We collected the number of teeth at each examination. Psychological disorders were defined as a score of ≥ 6 on the Brief Symptoms Rating Scale. The generalized estimating equation (GEE) model was used to examine the longitudinal relationships between changes in the number of teeth and developing psychological disorders.

Results

Participants lost an average of 5.2 teeth during follow-up, with 25.6% dropping more than one level from baseline. After GEE analysis with adjustment for multiple covariates, participants whose tooth number dropped by more than one level had a higher risk of developing psychological disorders (Odds ratio [OR]: 1.13, 95% confidence interval [CI]: 1.07–1.19). Subgroup analysis showed that participants with more than 20 teeth (OR: 0.86; 95% CI: 0.78–0.93) or 10-19 teeth (OR: 0.87; 95% CI: 0.76–0.99) at baseline had a lower risk of developing psychiatric disorders than those without dentures.

Table 1. Baseline characteristics and demographics of the study population (N=65,518)

Characteristics, n (%)	Total	≥ 20 (n=50,857)	10–19 (n=7,414)	1–9 (n=4,041)	no teeth (n=3,206)	P value
Age, yrs (mean±SD)	72.5 ± 6.6	71.8 ± 6.4	74.1 ± 6.6	75.4 ± 6.9	75.9 ± 6.9	<.001
Sex						
Male	34,503 (52.7)	26,724 (52.6)	4,014 (54.1)	2,094 (51.8)	1,671 (52.1)	0.040
Female	31,015 (47.3)	24,133 (47.4)	3,400 (45.9)	1,947 (48.2)	1,535 (47.9)	
Educational attainment (years), missing data=1,373						
≤ 6	21,385 (33.3)	15,552 (31.2)	2,776 (38.5)	1,687 (43.1)	1,370 (44.0)	<.001
7–9	8,945 (13.9)	6,917 (13.9)	1,084 (15.0)	531 (13.6)	413 (13.3)	
≥ 10	33,815 (52.7)	27,424 (55.0)	3,359 (46.5)	1,698 (43.4)	1,334 (42.8)	
Low–income household	3,052 (4.7)	2,074 (4.1)	444 (6.0)	285 (7.1)	249 (7.8)	<.001
Marital status, missing data=235						
Married	48,931 (74.9)	38,835 (76.6)	5,261 (71.2)	2,720 (67.6)	2,115 (66.3)	<.001
Not married	16,352 (25.1)	11,849 (23.4)	2,127 (28.8)	1,302 (32.4)	1,074 (33.7)	
Living alone	3,777 (5.8)	2,834 (5.6)	467 (6.3)	279 (6.9)	197 (6.1)	<.001
BMI category, missing data=693						
Underweight	2,194 (3.4)	1,554 (3.1)	271 (3.7)	218 (5.5)	151 (4.8)	<.001
Normal weight	29,399 (45.4)	22,885 (45.4)	3,269 (44.7)	1,812 (45.6)	1,433 (45.4)	
Overweight	21,215 (32.7)	16,690 (33.1)	2,322 (31.8)	1,211 (30.5)	992 (31.4)	
Obesity	12,017 (18.5)	9,258 (18.4)	1,447 (19.8)	731 (18.4)	581 (18.4)	
Periodontitis	36,395 (55.6)	28,752 (56.5)	4,690 (63.3)	1,868 (46.2)	1,085 (33.8)	<.001
Medication history						
Hypertension	23,674 (36.1)	18,054 (35.5)	2,802 (37.8)	1,586 (39.3)	1,232 (38.4)	<.001
Diabetes	7,071 (10.8)	5,038 (9.9)	981 (13.2)	574 (14.2)	478 (14.9)	<.001
Hyperlipidemia	3,597 (5.5)	2,833 (5.6)	396 (5.3)	206 (5.1)	162 (5.1)	0.344
Heart disease	9,288 (14.2)	6,959 (13.7)	1,136 (15.3)	665 (16.5)	528 (16.5)	<.001
Current smoker, missing data=150	5,344 (8.2)	3,747 (7.4)	788 (10.7)	430 (10.7)	379 (11.8)	<.001
Occasional or frequent drinking, missing data=162	12,782 (19.6)	10,256 (20.2)	1,344 (18.2)	645 (16.0)	537 (16.8)	<.001
Exercise (20+ minutes per week), missing data=356	59,726 (91.7)	46,813 (92.5)	6,640 (90.1)	3,500 (87.3)	2,773 (87.0)	<.001
With use of denture	16,005 (24.4)	5,483 (10.8)	4,584 (61.8)	3,049 (75.5)	2,889 (90.1)	<.001

Note: BMI, body mass index; married, married living together, cohabiting; unmarried, unmarried, divorced, widowed, married living separately.

Table 2. Association of number of teeth and psychiatric disorders by multivariable adjusted GEE analysis.

Variable	Model 1[*] OR	95% CI	Model 2[**] OR	95% CI	Model 3[***] OR	95% CI
Number of teeth						
≥ 20	Reference		Reference		Reference	
10–19	1.08	0.99–1.17	1.02	0.94–1.10	1.00	0.92–1.08
1–9	1.03	0.93–1.15	1.00	0.89–1.11	1.02	0.91–1.13
no teeth	1.17	1.04–1.33	1.07	0.94–1.21	1.15	1.01–1.30
With use of denture	0.83	0.78–0.89	0.87	0.81–0.93	0.87	0.81–0.93
Dropped one level or more[****]	1.14	1.09–1.21	1.13	1.08–1.20	1.13	1.07–1.19

[*]Model 1 was adjusted for age and sex.

[**]Model 2: Adjusted with age, sex, years of education, low-income household, marital status, living alone, smoking, drinking, exercise, and baseline BSRS-5 score.

[***]Model 3: Adjusted with age, sex, years of education, low-income household, marital status, living alone, smoking, drinking, exercise, baseline BSRS-5 score, BMI category, periodontitis, hypertension, heart disease, diabetes, and hyperlipidemia.

[****]Dropped one level or more: ≥ 20 teeth remaining at baseline with fewer than 20 teeth remaining at the last examination; or 10–19 teeth remaining at baseline with fewer than 10 teeth remaining at the last examination; or 1–9 teeth remaining at baseline with no remaining teeth at follow-up.

OR=odds ratio; 95% CI=95 % confidence interval

Table 3. Subgroup analysis of the association between changes in the number of teeth and psychiatric disorders among participants with different number of teeth at baseline by multivariable-adjusted GEE analysis.

Variable	≥ 20 OR[*]	95% CI	10–19 OR[*]	95% CI	1–9 OR[*]	95% CI
With use of denture	0.86	0.78–0.93	0.87	0.76–0.99	0.99	0.79–1.25
Dropped one level or more[**]	1.09	1.03–1.16	1.21	1.05–1.39	1.32	1.09–1.60

[*]Adjusted for age, sex, years of education, low-income household, marital status, living alone, smoking, drinking, exercise, baseline BSRS-5 score, body mass index, periodontitis, hypertension, heart disease, diabetes, and hyperlipidemia.

[**]Dropped one level or more: ≥ 20 teeth remaining at baseline with fewer than 20 teeth remaining at the last examination; or 10–19 teeth remaining at baseline with fewer than 10 teeth remaining at the last examination; or 1–9 teeth remaining at baseline with no remaining teeth at follow-up.

OR=odds ratio; 95% CI=95 % confidence interval

Conclusions

A rapid decrease in the number of teeth was associated with an increased risk of developing psychological disorders in older adults. Using dentures can reduce this risk until the number of teeth drops below 10.