# Factors Influencing Stress And The Impact Of Oral Health In Middle-Aged And Older Korean Population

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**KEYWORDS**:

Oral health, Stress, Socioeconomic status

**ABSTRACT**

**Objectives:** This study investigated the factors related to stress and the impact of Oral health in the middle-aged and older Korean population.
**Methods:** The samples were derived from the data collected during the first year of the 8th Korea National Health and Nutrition Examination Survey (KNHANES). The study targeted a total of 4,076 adults who were aged 40 years and more, and multiple logistic regression analysis was conducted. Chewing level and periodontitis were selected as the indicators of oral health.
**Results:** The prevalence of stress was 83.5%. and factors related to stress included gender, age, income, education, drinking alcohol, economic activity, number of household members, chewing difficulty, periodontitis. For chewing difficulty, the odds ratio (ORs) for stress in moderate and severe, compared to none, were 1.485 (95% confidence interval [CI], 1.188–1.856) and 1.756 (95% CI, 1.353–2.280), respectively. The OR for periodontitis was 1.336 (95% CI, 1.069–1.669) compared to none.
**Conclusion:** Our study suggests that public health professionals should consider the socio-economic factors and oral health to manage the stress resulted in seriously threatening general health in the community.

## INTRODUCTION:

Additionally, oral healthcare was reported to have good overall health among older adults (1). Psychological health was also suggested to be closely related to physical health (2). Therefore, we tried to investigate the affecting factors of stress and the impact on oral health among middle and older Korean adults. Various factors were closely connected with the cause of stress (3). Especially oral health was especially reported to be associated with psychological distress in women (4). On the other hand, periodontal discomfort was also reported to be stress among the elderly (1). Given the population distribution characteristics in Korea, the aging of the population is occurring rapidly. Consequently, with the rapid growth of the elderly population, it is anticipated that elderly individuals will account for 40.1% of the entire population by 2060 (5). As a result, successful aging and policies focusing on the health management of elderly individuals have become significant areas of interest. These policies aim to extend the lifespan of the rapidly growing elderly population. The period of old age is characterized by various notable health concerns, including the decline in physical functions, age-related disorders, shifts in social, and psychological disposition, and mental adaptation. The psychological well-being of elderly individuals is shaped by demographic, economic, physical, and psychological factors, such as

stress (6). Stress is defined as the physiological and metabolomic disturbances caused by various aggressive agents, coupled with the psycho-physiological response of an organism when perceiving a challenge or threat. (7). Stress, which is well known as the major affecting factor of general health, is emerging as a key issue in oral health as well as being associated with quality of life (1). It was reported that socioeconomic factors were clinically associated with stress (2). In particular, occupational stress was reported to be related to periodontitis among workers (8, 9). Oral health pertains to the well-being of the oral cavity, serving as the foundational aspect of overall health. The oral cavity and mouth serve as crucial components of human anatomy, facilitating communication between individuals. Swallowing, a vital aspect of digestion, is predominantly reliant on the mouth, which also significantly contributes to one's physical appearance (10). Stress is intricately linked with oral diseases among the elderly. Individuals aged 65 and above encounter increased challenges in oral functions such as mastication, swallowing, and oral motor skills. Stress-induced oral dryness not only disrupts the buffering action of saliva, hastening the advancement of oral diseases but also exacerbates periodontal inflammation by inducing immune suppression. This, in turn, leads to alveolar bone loss and diminished gum attachment. (11, 12). Numerous studies have demonstrated that prolonged exposure to chronic psychosocial stress heightens the risk of deteriorating oral health in adults (13). Li and Kong (2022) similarly identified a correlation between stress levels and oral health status. Psychosocial stress has been implicated in the development and progression of both oral and systemic diseases, partially contributing to social disparities in oral and general health outcomes (15). The significant relationship between stress and oral health underscores the interplay between mental and oral well-being (16). Previous studies have identified associations between oral health and various psychosocial factors that may influence different types of stress (17). Moreover, adults reporting fair or poor oral health also tend to experience higher levels of psychosocial stressors compared to those with better self-rated oral health (18). Finlayson et al. (2010) found that higher levels of stress lead to higher levels of oral health. Ma and Cho (2016) identified that stress affects the oral health of adolescents. Furthermore, Won and Kim (2015) investigated the perceived oral health of adults, revealing its association with higher levels of mental stress. Elevated levels of cortisol, secreted in response to stress, have been significantly linked to periodontal disease (20). Recent data indicate that individuals perceiving higher life stress are at increased risk of inadequate oral health (21). While existing research has primarily focused on adults and adolescents, studies on elderly individuals are scarce. Particularly, research on the relationship between psychosocial stress and oral health in the elderly remains limited. Therefore, the present study utilized raw data from the Korean National Health and Nutrition Examination Survey (KNHANES) to explore the association between perceived oral health among middle-aged and elderly individuals and various psychological health factors, including stress.

## MATERIALS AND METHODS:

### Study design

We used a cross-sectional study design data from KNHANES (Korea Nation Health and Nutrition Examination Survey) which is composed of health examination, health interview and nutritional survey. The KNHANES data was approved in the Institutional Review Board by Korea Centers for Disease Control. With the 8th KNHANES dataset, we investigated 4,076 adults who were aged 40 years and above. To identify the major affecting factors of stress and the impact of oral health by analyzing and using complex sampling methods. All participants provided informed consent to participate in the survey.

### Definition of Stress

Stress was assessed using the question “How much stress do you feel in your daily life? Thereafter, individuals who responded “moderate and severe” were defined as depression group.

**Demographic Characteristics and Oral Health**

For the health interview survey, we chose demographic variables such as gender, age, residence, spouse, education and household income, smoking status, drinking, physical activity, daily sleep time, economic activity and number of household member. We selected education level and income level as socioeconomic indicators. Age group was divided into two groups: 40-49, 50 or more. The residence area was categorized into urban and rural. Having a spouse was categorized into two groups; yes and no. Income level was divided into four categories based on quartiles: lowest, medium-lowest, medium-highest, highest. Education level was divided into four categories: Elementary school or less, Middle school, High school, College or higher. Smoking was divided into two categories: non-smoker and current smoker. A current smoker was defined as an individual who had smoked 100 or more cigarettes and was still smoking. The non-smoker category included former smokers. Alcohol drinking was split into two categories: non-drinkers and current-drinkers. An Individuals who consumed 3 or more drinks per day and those who consumed alcohol once or more a month, were simply classified as current drinkers. Physical exercise was divided into non-exercise and regular exercise. The regular exercise category included individuals who exercised 3 or more times a week, with each session lasting more than 20 minutes. 7-8 hours of sleep a day was classified into two groups; 7-8 hours/day (yes) and more or less than 7-8 hours/day (no). Economic activity was categorized into two groups; yes and no. Family members was divided into four mutually exclusive groups; living alone, living with 2 family members, living with 3 family members, living with 4 and over family members. Oral health was chewing difficulty and periodontitis. Chewing difficulty was defined into three groups: none, moderate, severe. Periodontitis was categorized into two groups; yes and no.

**Statistical analysis**

We utilized the Stata 12.0 program (Stata Corp LLC.) for our statistical analysis. Descriptive statistics was used for general characteristics. The Chi-square test or one-way analysis of variance (ANOVA) was used for comparison of the association between stress and determinant factors. Multiple logistic regression analysis was used to find out the determinants of stress according to gender after adjusting. A two-sided P-values lower than 0.05 were regarded to be statistically significant.

**RESULTS:**

Table 1 shows the general characteristics of the 4,076 study participants. In gender, male were 25.0% and female were 75.0%. Almost all subjects (82.2%) were in married status with spouse. In view of socio-economic status, college or more were 33.3% in education level and about a quarter was in lowest income level. With life-style factors, current- smoker 14.2%, current-drinker 87.1%, non-exercise 34.9% and more or less than 7-8 hours of sleep a day 51.5% factors were showed. 24.1% were suffered from chewing function difficulty and about 23.6% of respondents had periodontitis. The subjects who complained stress were 83.5%.

Table 1. General characteristics

| Variables | N (4076) | % |
|---|---|---|
| Gender | | |
| Male | 1719 | 42.2 |
| Female | 2357 | 57.8 |
| Age | | |
| 40-49 | 1244 | 30.5 |
| 50 and over | 2832 | 69.5 |
| Residence | | |

| | | |
|---|---|---|
| Urban | 3141 | 77.1 |
| Rural | 935 | 22.9 |
| Spouse | | |
| No | 724 | 17.8 |
| Yes | 3352 | 82.2 |
| Income level | | |
| Lowest | 976 | 23.9 |
| Middle-low | 1012 | 24.8 |
| Middle-high | 1068 | 26.2 |
| Highest | 1020 | 25.0 |
| Education level | | |
| Elementary | 978 | 24.0 |
| Middle | 481 | 11.8 |
| High | 1261 | 30.9 |
| College and over | 1356 | 33.3 |
| Smoking | | |
| No | 3496 | 85.8 |
| Yes | 580 | 14.2 |
| Drinking | | |
| No | 527 | 12.9 |
| Yes | 3549 | 87.1 |
| Physical activity | | |
| No | 1423 | 34.9 |
| Yes | 2653 | 65.1 |
| Sleeping time | | |
| No | 2098 | 51.5 |
| Yes | 1978 | 48.5 |
| Economic activity | | |
| No | 1648 | 40.4 |
| Yes | 2428 | 59.6 |
| Number of household members | | |
| 1 | 471 | 11.6 |
| 2 | 1454 | 35.7 |
| 3 | 989 | 24.3 |
| 4 and over | 1162 | 28.5 |
| Chewing difficulty | | |
| None | 2396 | 58.8 |
| Moderate | 699 | 17.1 |
| Severe | 981 | 24.1 |
| Periodontitis | | |
| No | 3113 | 76.4 |
| Yes | 963 | 23.6 |
| Stress | | |
| No | 674 | 16.5 |
| Yes | 3402 | 83.5 |

All values are frequency and percentage

Table 2 depicts association between depression and determinant factors. The incidence of stress was 41.9% for male and 58.1% for female. This study explained that the associated factors of depression were living urban area (73.7%), No spouse (26.6%), highest income level (28.0%), highest education level (28.0%), smoking (11.7%), drinking (80.4%), no physical exercise (36.1%), periodontitis (18.2%), and moderate and severe chewing difficulty (37.7%) in order.

Table 2. Prevalence of Association between stress and determinant factors

| | Stress | | P* |
|---|---|---|---|
| | No | Yes | |
| Variables | | | |
| Gender | | | 0.455 |
| Male | 293(43.5) | 1426(41.9) | |
| Female | 381(56.5) | 1976(58.1) | |
| Age | | | <0.001 |
| 40-49 | 114(16.9) | 1130(33.2) | |
| 50 and over | 560(83.1) | 2272(66.8) | |
| Residence | | | |
| Urban | 497(73.7) | 2644(77.7) | 0.025 |
| Rural | 177(26.3) | 758(22.3) | |
| Spouse | | | <0.001 |
| No | 179(26.6) | 545(16.0) | |
| Yes | 495(73.4) | 2857(84.0) | |
| Income level | | | 0.035 |
| Lowest | 135(20.1) | 841(24.7) | |
| Middle-low | 165(24.5) | 847(24.9) | |
| Middle-high | 185(27.4) | 883(26.0) | |
| Highest | 189(28.0) | 831(24.4) | |
| Education level | | | <0.001 |
| Elementary | 251(37.3) | 727(21.4) | |
| Middle | 79(11.7) | 402(11.8) | |
| High | 155(23.0) | 1106(32.5) | |
| College and over | 189(28.0) | 1167(34.3) | |
| Smoking | | | 0.041 |
| No | 595(88.3) | 2901(85.3) | |
| Yes | 79(11.7) | 501(14.7) | |
| Drinking | | | <0.001 |
| No | 132(19.6) | 395(11.6) | |
| Yes | 542(80.4) | 3007(88.4) | |
| Physical activity | | | 0.496 |
| No | 243(36.1) | 1180(34.7) | |
| Yes | 431(63.9) | 2222(65.3) | |
| Sleeping time | | | 0.270 |
| No | 360(53.4) | 1738(51.1) | |
| Yes | 314(46.6) | 1664(48.9) | |
| Economic activity | | | |
| No | 371(55.0) | 1277(37.5) | <0.001 |
| Yes | 303(45.0) | 2125(62.5) | |
| Number of household members | | | <0.001 |

| | | | |
|---|---|---|---|
| 1 | 139(20.6) | 332(9.8) | |
| 2 | 267(39.6) | 1187(34.8) | |
| 3 | 129(19.1) | 860(25.3) | |
| 4 and over | 139(20.7) | 1023(30.1) | |
| Chewing difficulty | | | 0.003 |
| None | 420(62.3) | 1976(58.1) | |
| Moderate | 85(12.6) | 614(18.0) | |
| Severe | 169(25.1) | 812(23.9) | |
| Periodontitis | | | <0.001 |
| No | 551(81.8) | 2562(75.3) | |
| Yes | 123(18.2) | 840(24.7) | |

All values are N(%) .

*Calculated by Chi-square test or ANOVA.

Table 3. demonstrates the determinant factors of stress, such as gender, age, level of education, presence of spouse, income, and economic activity, and its impact on oral health. The subjects were male than female, and the age was 35-49 years old than 50 years old or older, the higher the income level, the lower the education level, the higher the number of family members, the higher the difficulty of chewing, and the more the periodontitis. For Chewing difficulty, the odds ratio (ORs) for stress in moderate and severe, compared to none, were 1.485 (95% confidence interval [CI], 1.188–1.856) and 1.756 (95% CI, 1.353–2.280), respectively. The OR for Periodontitis was 1.336 (95% CI, 1.069–1.669) compared to none. The results found that stress affected the perceived oral health of middle and older adults

Table 3. Multivariable logistic regression analysis for determinant factors of stress

| | Stress | | |
|---|---|---|---|
| Variables | OR | 95% CI | P* |
| Gender | | | |
| Male | 1.521 | 1.246-1.856 | <0.001 |
| Female | | Reference | |
| Age | | | |
| 40-49 | 1.693 | 1.291-2.220 | <0.001 |
| 50 and over | | Reference | |
| Residence | | | |
| Urban | | Reference | |
| Rural | 0.850 | 0.691-1.046 | 0.125 |
| Spouse | | | |
| No | | Reference | |
| Yes | 1.128 | 0.848-1.499 | 0.409 |
| Income level | | | |
| Lowest | 1.910 | 1.463-2.495 | <0.001 |
| Middle-low | 1.374 | 1.073-1.761 | 0.012 |
| Middle-high | 1.142 | 0.902-1.446 | 0.271 |
| Highest | | Reference | |
| Education level | | | |
| Elementary | 0.737 | 0.555-0.978 | 0.034 |
| Middle | 1.151 | 0.831-1.594 | 0.397 |
| High | 1.336 | 1.040-1.716 | 0.023 |
| College | | Reference | |
| Smoking | | | |

| | | | |
|---|---|---|---|
| No | | Reference | |
| Yes | 1.077 | 0.815-1.425 | 0.602 |
| Drinking | | | |
| No | | Reference | |
| Yes | 1.384 | 1.088-1.762 | 0.008 |
| Physical activity | | | |
| No | 1.043 | 0.867-1.255 | 0.654 |
| Yes | | Reference | |
| Sleeping time | | | |
| No | 1.019 | 0.857-1.213 | 0.828 |
| Yes | | Reference | |
| Economic activity | | | |
| No | | Reference | |
| Yes | 1.855 | 1.538-2.237 | <0.001 |
| Number of household members | | | |
| 1 | | Reference | |
| 2 | 1.778 | 1.293-2.444 | <0.001 |
| 3 | 2.145 | 1.516-3.035 | <0.001 |
| 4 and over | 2.059 | 1.147-2.952 | <0.001 |
| Chewing difficulty | | | |
| None | | Reference | |
| Moderate | 1.485 | 1.188-1.856 | 0.001 |
| Severe | 1.756 | 1.353-2.280 | <0.001 |
| Periodontitis | | | |
| No | | Reference | |
| Yes | 1.336 | 1.069-1.669 | 0.011 |

All values are odds ratios with 95% confidence intervals.
*Calculated by Multi-logistics test.

**DISCUSSION:**

According to the findings, stress levels were higher among males, and the elevated mental burden could elucidate the frequent failures in dental consultations. Stress manifested its influence on oral health in relation to gender, particularly impacting male participants.

Younger adults (20-39 years old) with high stress levels and hectic lifestyles exhibited a greater risk of inadequate oral health compared to middle-aged and older adults, aligning with previous studies (21). Research indicates that individuals of lower socioeconomic status and those experiencing heightened stress levels and reduced personal control are more inclined to rate their oral health poorly (22). Our study corroborates these findings, identifying that respondents with high stress levels and low household income faced an increased risk of inadequate oral health, echoing the findings of Hensel and Gomaa (2023). Regarding the association between general characteristics of middle-aged and older adults and stress, stress prevalence was notably high among male participants with low incomes, consistent with Lee et al.'s (2017) study showing that low-income individuals exhibited elevated stress levels. Furthermore, our findings regarding income parallel those of Cho and Choi (2016), indicating that low-income groups experienced heightened stress levels. Additionally, stress was observed to impact the family members of middle-aged and older adult participants. Data suggested that adults with lower income levels experienced elevated stress levels, and those exposed to stressors were more likely to report fair or poor oral health status. Our study identified family members and lower income as the most influential factors of stress among 4,076 Korean adults aged 35 and above. Subsequently, economic

activity, poor oral health status (such as chewing difficulty and periodontitis), low education levels, the 35-49 age group, the 50 and older group, male gender, and alcohol consumption were identified as subsequent factors affecting stress levels. Stress has been consistently linked to periodontal disease in recent literature reviews (7, 25). Clinical studies exploring the relationship between psychological stress and periodontitis suggest that stress may contribute to the development of periodontal disease (26, 27, 28). Financial difficulties and distress associated with psychosocial stress are identified as risk factors for periodontal disease (26). Moreover, individuals experiencing high-stress levels often engage in habits detrimental to periodontal health. While numerous studies have examined the relationship between physical and psychosocial stressors and destructive periodontal changes, the precise mechanisms through which stress influences periodontal disease remain incompletely understood, necessitating further research. Our study reinforces the notion that stress heightens the risk of inadequate oral health, emphasizing the potential roles
of social and economic factors in mitigating stress's impact on oral health.

**CONCLUSIONS:**

This study aims to explore the relationship between stress and subjective oral health among middle-aged and elderly individuals in South Korea, laying the groundwork for developing an educational program promoting oral health and stress management. Thus, it is imperative to educate men on accepting tooth loss as a natural part of aging and highlight the adverse consequences of untreated dental issues on oral health. Additionally, given the tendency of elderly men to neglect their health, consistent health education emphasizing the importance of regular oral check-ups is essential. Future research should examine various factors such as social support, chronic diseases, and health activities relevant to stress among elderly individuals. Before implementing oral health programs for the elderly, personalized health education, including oral health management for low-income individuals, and stress management programs should be developed. Investigating whether reducing stress could prevent periodontal disease and improve treatment outcomes would be valuable. If proven effective, it would be imperative to prioritize stress reduction interventions and refer patients to psychologists or stress medicine specialists as needed.

**Notes**

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