



Original Article

The relationship between health-related quality of life, oral health, and depression in seniors aged 65 or older

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ABSTRACT

Objectives: This study aimed to analyze the impact of health-related quality of life and oral health on depression in seniors aged 65 and older, proposing measures to improve their quality of life and prevent depression. **Methods:** Data from the 2022 Community Health Survey, conducted by the Korea Disease Control and Prevention Agency, were analyzed, focusing on 79,441 seniors. **Results:** Of the participants, 57.2% were female, and 42.8% were male. Poor oral health was associated with worse general health perception. Depression was linked to stress, suicidal thoughts, chewing discomfort, and cognitive impairment, while happiness and positive health perceptions were protective factors. **Conclusions:** Managing stress and enhancing positive health perceptions are key to reducing depression among the elderly.

Key Words: Depression, Elderly, Mastication discomfort, Oral health, Quality of life

Introduction

According to the latest Statistics Korea Future Population Projections, the number of individuals of ≥ 65 years of age in Korea is expected to increase from 17.4% in 2022 to 20.3% in 2025, 30.9% in 2036, and exceed 40% in 2050 due to longer life expectancy and declining fertility rates [1]. This rapid demographic shift highlights the transition toward a society with predominantly older individuals and underscores the growing focus on the health and quality of life (QOL) of older adults.

The aging process is accompanied by degenerative changes in the body, leading to decreased physiological function, limitations in daily activities, and an increased prevalence of chronic degenerative diseases [2]. With advancing age, declines in physical function, functional impairment, pathological changes, and loss of abilities become evident, significantly affecting the physical, psychological, and social health of older adults. These changes play a decisive role in shaping their QOL [3].

The oral cavity is essential for chewing and nutrient intake and thus is a vital organ for sustaining life and maintaining health [4]. Poor oral health not only hampers nutritional intake, but also exacerbates age-related diseases, such as cardiovascular disease and diabetes mellitus, while potentially triggering systemic conditions [5]. The deterioration of oral function is a significant factor compromising the overall health and QOL of older adults [6]. Furthermore, the prevalence of depression in older adults has gained increasing attention in societies with rising number of older individuals. Depression is closely linked to general QOL [7] and is a condition that needs to be managed to enhance the well-being of older adults. As a facet of mental health, depression can progress from depressive mood to severe depressive episodes, becoming more pronounced with advancing age [8].

The 2020 National Survey of Older Koreans conducted by the Ministry of Health and Welfare reported that 13.5% of older adults exhibited depressive symptoms, with higher prevalence observed in the older age groups [9]. Depression in later life affects

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cognitive decline, exacerbates chronic conditions, and increases disability and mortality rates [10]. Moreover, depression in older adults can hinder health-promoting behaviors, and in severe cases, lead to serious consequences such as suicide [11], requiring appropriate prevention and treatment strategies.

Previous studies often focused on QOL and oral health as dependent variables [7]. In contrast, this study adopted a novel approach by examining depression as the dependent variable, with QOL and oral health as independent variables. This framework is grounded in the premise that oral health significantly impacts not only physical health, but also mental health, and the study aimed to investigate the effects of QOL on depression. We analyzed the relationships between health-related QOL, oral health, and depression among adults of ≥ 65 years of age using the raw data from the Community Health Survey (CHS 2022) conducted by the Korea Disease Control and Prevention Agency (KDCA) [12], to provide actionable insights into preventing depression and improving the well-being of older adults.

Methods

1. Study participants

This study utilized raw data from the CHS 2022 conducted nationwide by the KDCA [12]. The CHS is mandated under the Regional Public Health Act and involves approximately 900 participants per health center across 255 regions. Data is collected through face-to-face interviews by trained investigators. This study analyzed data from 79,441 older adults of ≥ 65 years of age. Ethical compliance was ensured by adhering to the guidelines for raw data usage provided by the KDCA, and the study was exempt from review based on Article 2, Paragraph 2 of the Bioethics and Safety Act Implementation Rules.

2. Instruments

The study collected data on demographic variables such as age, sex, marital status, subjective health, subjective oral health, and chewing discomfort. Variables for analyzing predictors of depressive symptoms included EuroQol five-dimension (EQ-5D), subjective happiness, subjective health, sleep duration, days of vigorous physical activity, days of moderate physical activity, days of walking activity, experience of depressive symptoms, suicidal ideation, stress levels, and experience of cognitive impairment. Subjective health and oral health were categorized as good, fair, or poor. Stress levels were classified as high, moderate, or none, and chewing discomfort was categorized as severe, moderate, or none. Vigorous physical activity included occupational or recreational activities such as running, hiking, cycling at high speed, swimming, soccer, and basketball. Moderate physical activity included activities such as slow swimming, doubles tennis, volleyball, badminton, and light lifting. Walking activity was defined as walking for at least 10 minutes at a time. Happiness was assessed on a scale of 1 (very dissatisfied) to 10 (very satisfied).

EQ-5D is a widely used tool for measuring health-related QOL (HRQOL) and encompasses five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Responses were categorized into three levels: no, moderate, and severe difficulty levels. To better identify older adults with low HRQOL, a new variable, 'low HRQOL', was created by categorizing those who reported severe difficulty in any dimension. Individuals reporting no or moderate difficulty were classified as the normal group, which allows for a clearer understanding of the degree of QOL impairment experienced by older adults.

3. Data analysis

The collected data were analyzed using the IBM SPSS Statistics (ver. 21.0; IBM Corp., Armonk, NY, USA). Given the complex sample design of the CHS, sampling weights were used in the analysis. General characteristics were described using frequency and percentage. The QOL characteristics were compared between the normal and low HRQOL groups using the EQ-5D dimensions,

depressive symptoms, suicidal ideation, cognitive impairment, stress levels, subjective health, subjective oral health, and chewing discomfort. Chi-squared test was used for categorical variables, while t-test was used for continuous variables such as average daily sleep duration, happiness score, days of vigorous and moderate physical activity, and walking activity. Logistic regression analyses were performed to examine the relationships between HRQOL, oral health, and depression. Statistical significance was set at $p < 0.05$.

Results

1. General characteristics

Among the study population, 57.2% were women and 42.8% men. The majority (54.1%) were of 65–74 years of age, followed by 36.2% of 75–84 years and 9.7% of ≥ 85 years. Regarding marital status, 62.8% lived with a spouse, 30.0% had no spouse, 3.8% were divorced, and 0.7% were never married. Subjective health status was reported as fair by 38.8%, poor by 36.6%, and good by 24.6%. Subjective oral health was predominantly rated as poor (48.6%), followed by fair (33.6%) and good (17.9%). Chewing discomfort was reported as severe by 34.8%, moderate by 17.2%, and none by 48.0% <Table 1>.

Table 1. General characteristics of the participants

| Characteristics | Division | N | % |
|-------------------------------|-----------------------|--------|-------|
| Gender | Male | 33,962 | 42.8 |
| | Female | 45,479 | 57.2 |
| Age (yr) | Total | 79,441 | 100.0 |
| | 65-74 | 43,014 | 54.1 |
| | 75-84 | 28,719 | 36.2 |
| | ≥ 85 | 7,708 | 9.7 |
| Marriage | Total | 79,441 | 100.0 |
| | Living with spouse | 49,919 | 62.8 |
| | Separated from spouse | 2,077 | 2.6 |
| | No spouse | 23,837 | 30.0 |
| | Divorced | 3,024 | 3.8 |
| | Single | 574 | 0.7 |
| Subjective health status | Total | 79,431 | 100.0 |
| | Good | 19,546 | 24.6 |
| | Average | 30,786 | 38.8 |
| | Poor | 29,108 | 36.6 |
| Subjective oral health status | Total | 79,440 | 100.0 |
| | Good | 14,182 | 17.9 |
| | Average | 26,653 | 33.6 |
| | Poor | 38,603 | 48.6 |
| Mastication discomfort | Total | 79,438 | 100.0 |
| | Uncomfortable | 27,648 | 34.8 |
| | Moderate | 13,640 | 17.2 |
| | Not uncomfortable | 38,152 | 48.0 |
| | Total | 79,441 | 100.0 |

2. QOL characteristics

<Table 2> compares the characteristics of older adults with low HRQOL vs. those with normal HRQOL. Across all characteristics, the low HRQOL group demonstrated significantly higher adverse outcomes than the normal group.

In the EQ-5D dimensions, the proportion of individuals experiencing severe pain or discomfort was significantly higher in the low HRQOL group (77.8%) compared to the normal group. Similarly, activity limitations were pronounced in daily activities (30.0%), self-care (21.3%), mobility (19.1%), and anxiety/depression (16.4%). Stress levels were elevated in the low HRQOL group, with 71.7% reporting high stress compared to 59.0% in the normal group. Moreover, experiences of depression (28.3%), suicidal ideation (34.3%), and cognitive impairment (59.2%) were significantly more prevalent in the low HRQOL group. In the low HRQOL group, 85.1% reported poor subjective health, 73.9% reported poor subjective oral health, and 65.3% experienced chewing discomfort.

The average sleep duration did not differ significantly between groups (6.57 hours for the normal group vs. 6.49 hours for the low HRQOL group). The happiness index (6.82 vs. 5.22), days of vigorous (0.41 vs. 0.16) and moderate (1.16 vs. 0.50) physical activities, and walking practice days (4.12 vs. 2.23) were all significantly lower in the low HRQOL group.

Table 2. Comparison of quality-of-life characteristics

| Characteristics | Division | Normal group | | Low group | | $\chi^2/t(p^*)$ |
|------------------------------------|-------------------|--------------|------|-----------|------|-------------------|
| | | N | % | N | % | |
| EQ-5D mobility | None | 48,895 | 67.0 | 621 | 9.6 | 19492.536(<0.001) |
| | Mild | 24,084 | 33.0 | 4,606 | 71.3 | |
| | Severe | 0 | 0.0 | 1,235 | 19.1 | |
| EQ-5D self-care | None | 65,852 | 90.2 | 2,486 | 38.5 | 21903.737(<0.001) |
| | Mild | 7,126 | 9.8 | 2,597 | 40.2 | |
| | Severe | 0 | 0.0 | 1,378 | 21.3 | |
| EQ-5D usual activities | None | 55,676 | 76.3 | 967 | 15.0 | 27262.134(<0.001) |
| | Mild | 17,302 | 23.7 | 3,551 | 55.0 | |
| | Severe | 0 | 0.0 | 1,940 | 30.0 | |
| EQ-5D pain/discomfort | None | 37,715 | 51.7 | 236 | 3.7 | 60822.473(<0.001) |
| | Mild | 35,264 | 48.3 | 1,196 | 18.5 | |
| | Severe | 0 | 0.0 | 5,030 | 77.8 | |
| EQ-5D anxiety/depression | None | 62,921 | 86.2 | 2,754 | 42.7 | 16075.562(<0.001) |
| | Mild | 10,050 | 13.8 | 2,638 | 40.9 | |
| | Severe | 0 | 0.0 | 1,060 | 16.4 | |
| Experience of depression | Negative | 67,747 | 92.9 | 4,627 | 71.7 | 3284.325(<0.001) |
| | Positive | 5,212 | 7.1 | 1,826 | 28.3 | |
| Experience of suicidal ideation | Negative | 67,279 | 92.2 | 4,242 | 65.7 | 4643.082(<0.001) |
| | Positive | 5,698 | 7.8 | 2,215 | 34.3 | |
| Experience of cognitive impairment | Negative | 48,089 | 65.9 | 2,636 | 40.8 | 1613.952(<0.001) |
| | Positive | 24,870 | 34.1 | 3,817 | 59.2 | |
| Stress level | None | 29,872 | 41.0 | 1,821 | 28.3 | 398.341(<0.001) |
| | High | 43,074 | 59.0 | 4,625 | 71.7 | |
| Subjective health | Good | 19,324 | 26.5 | 222 | 3.4 | 7131.317(<0.001) |
| | Moderate | 30,043 | 41.2 | 743 | 11.5 | |
| | Poor | 23,611 | 32.4 | 5,497 | 85.1 | |
| Subjective oral health | Good | 13,616 | 18.7 | 566 | 8.8 | 1797.533(<0.001) |
| | Moderate | 25,530 | 35.0 | 1,123 | 17.4 | |
| | Poor | 33,831 | 46.4 | 4,772 | 73.9 | |
| Chewing discomfort | Uncomfortable | 23,429 | 32.1 | 4,219 | 65.3 | 2954.214(<0.001) |
| | Moderate | 12,815 | 17.6 | 825 | 12.8 | |
| | Not uncomfortable | 36,734 | 50.3 | 1,418 | 21.9 | |

Table 2. To be continued

| Characteristics | Division | Normal group | | Low group | | $\chi^2/t(p^*)$ |
|------------------------------------|----------|------------------------|---|------------------------|---|-----------------|
| | | N | % | N | % | |
| Average daily sleep time | | 6.57±3.09 [†] | | 6.49±4.74 [†] | | 1.702(0.089) |
| Happiness index | | 6.82±1.83 [†] | | 5.22±2.18 [†] | | 65.869(<0.001) |
| Days of vigorous physical activity | | 0.41±1.37 [†] | | 0.16±0.89 [†] | | 14.439(<0.001) |
| Days of moderate physical activity | | 1.16±2.18 [†] | | 0.50±1.56 [†] | | 23.767(<0.001) |
| Days of walking practice | | 4.12±2.79 [†] | | 2.23±2.84 [†] | | 51.972(<0.001) |

*by chi-square test or t-test

[†]Mean±SD

3. Predictors of depression in adults of ≥65 years of age

Logistic regression analysis was performed to identify the factors of HRQOL and oral health affecting depression in adults of ≥65 years of age. Significant predictors increasing the likelihood of depressive symptoms included high stress levels (odds ratio [OR]=2.661, $p<0.001$), suicidal ideation (OR=2.218, $p<0.001$), chewing discomfort (OR=1.784, $p<0.001$), and cognitive impairment (OR=1.446, $p<0.001$). Conversely, predictors associated with a reduced likelihood of depressive symptoms included higher happiness level (OR=0.859, $p<0.001$), better subjective health (OR=0.205, $p<0.001$), better subjective oral health (OR=0.851, $p<0.001$), and vigorous (OR=0.949, $p=0.001$) and moderate (OR=0.912, $p<0.001$) physical activities, with the OR values representing a decline of odds with every unit increase in each respective parameter. Average sleep duration (OR=1.001, $p=0.739$) was not a significant predictor of depressive symptoms. The logistic regression model was deemed a good fit based on the Hosmer & Lemeshow test ($\chi^2=7.587$, $p=0.485$) and explained approximately 32.0% of the variance in depressive symptoms (Nagelkerke $R^2=0.320$) <Table 3>.

Table 3. Predictive factors of depression

| Characteristics | B | SE | OR | 95% CI | | p^* |
|------------------------------------|--------|-------|-------|--------|-------|--------|
| | | | | LL | UL | |
| (Constant) | 1.066 | 0.045 | 2.903 | | | <0.001 |
| Subjective oral health | | | | | | |
| Subjective oral health (moderate) | 0.190 | 0.059 | 1.209 | 1.076 | 1.358 | 0.001 |
| Subjective oral health (good) | -0.161 | 0.042 | 0.851 | 0.783 | 0.924 | <0.001 |
| Chewing discomfort | | | | | | |
| Chewing discomfort (moderate) | 0.579 | 0.043 | 1.146 | 1.036 | 1.267 | <0.001 |
| Chewing discomfort (severe) | 0.136 | 0.051 | 1.784 | 1.638 | 1.942 | <0.001 |
| Subjective health | | | | | | |
| Subjective health (moderate) | -2.085 | 0.073 | 0.124 | 0.108 | 0.143 | <0.001 |
| Subjective health (good) | -1.583 | 0.043 | 0.205 | 0.189 | 0.223 | <0.001 |
| Days of vigorous physical activity | -0.052 | 0.016 | 0.949 | 0.920 | 0.980 | 0.001 |
| Days of moderate physical activity | -0.092 | 0.009 | 0.912 | 0.895 | 0.929 | <0.001 |
| Days of walking practice | -0.152 | 0.005 | 0.859 | 0.850 | 0.868 | <0.001 |
| Experience of cognitive impairment | 0.369 | 0.030 | 1.446 | 1.363 | 1.534 | <0.001 |
| Experience of suicidal thoughts | 0.797 | 0.036 | 2.218 | 2.066 | 2.381 | <0.001 |
| Happiness index | -0.152 | 0.008 | 0.859 | 0.845 | 0.873 | <0.001 |
| Average daily sleep time | 0.001 | 0.004 | 1.001 | 0.994 | 1.008 | 0.739 |
| Subjective stress (none) | | | | | | |
| Subjective stress (very high) | 0.979 | 0.069 | 2.661 | 2.325 | 3.046 | <0.001 |
| Subjective stress (high) | 0.143 | 0.042 | 1.154 | 1.063 | 1.253 | 0.001 |
| Subjective stress (low) | -0.001 | 0.036 | 0.784 | 0.730 | 0.841 | <0.001 |

CI: Confidence interval; OR: Odds ratio

*by logistic regression analysis

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Discussion

The rising prevalence of chronic diseases and increasing healthcare costs associated with aging, coupled with greater demand for long-term care, social isolation, depression, and suicide among older adults, have intensified the focus on health policies for this population [13]. This study aimed to analyze the relationship between overall QOL, oral health, and depression in older adults, providing foundational data for managing depression and improving QOL in this demographic group.

In the healthcare field, the emphasis on assessing individuals' subjective perceptions of physical and mental discomfort, in addition to medical diagnoses, is improving, regardless of disease presence [14]. Among adults of ≥ 65 years of age, 48.6% perceived their oral health as poor, compared to 36.6% who reported poor general health. This suggests that older adults tend to view their oral health more negatively than their overall health. These findings imply that oral health issues may occur more frequently or have a greater impact on daily life in this age group. Similarly, Choi and Jeong [15] found that older adults consider oral health issues as a priority among various health concerns, which aligns with the findings of this study. Because oral health plays a critical role in both QOL and physical health, it may be of relatively greater value in subjective health assessments.

These results, however, do not establish a direct causal relationship indicating that older adults perceive oral health as the most critical issue. Previous studies have demonstrated a strong correlation between objective oral health status and subjective perceptions of oral health [16], showing that individuals who perceive their oral health as good are more likely to report higher overall QOL. Subjective perceptions of oral health have a significant impact on the general health and QOL of older adults [7]. Since oral health affects nutrition and systemic health, increasing awareness and implementing efforts to improve oral health are essential. Regular oral check-ups and management are necessary to maintain and improve oral health, which will enable preventive measures and ultimately improve QOL.

Additionally, 34.8% of participants reported experiencing chewing discomfort. This is likely due to age-related oral health issues, such as tooth loss, contributing to more negative perceptions of subjective oral health.

In this study, we compared the characteristics of older adults with low and normal HRQOL. Among the EQ-5D domains, the prevalence of pain/discomfort was the highest in the low HRQOL group at 71.7%, followed by difficulty with daily activities at 30.0%. These findings highlight that pain and discomfort resulting from illness can significantly hinder daily activities, ultimately lowering QOL. Notably, older adults in the low HRQOL group were more likely to report higher stress levels, aligning with the findings of Yu and Hwang [17]. Additionally, limitations in daily activities and reduced QOL were closely associated with oral health in older adults [18]. Yang et al. [19] reported that physical activity positively impacts oral hygiene, systemic health, psychological well-being, and mental health, reducing depression and stress. Therefore, promoting health-management strategies and stress-reduction interventions to enable daily activities is essential for improving QOL in older adults.

Lee [20] identified late-life depression as a critical factor threatening QOL in older adults, noting that depressed individuals experience reduced physical functioning and activity levels and are less likely to engage in health-promoting behaviors [11]. Hence, managing depression in older adults is imperative. In this study, the strongest predictors of depression were stress, followed by suicidal ideation, chewing discomfort, and cognitive impairment. These findings are consistent with those of Choi and Lee [21], who reported that stress related to mental health is associated with both depression and chewing discomfort. Older adults experiencing significant chewing discomfort were also more likely to report cognitive impairment and undergo dementia screening tests [22]. Similarly, Won and Kim [23] found that chewing discomfort was linked to consultations for mental health issues, stress, depression, and suicidal thoughts, demonstrating the multifactorial nature of depression in this population. Thus, addressing depression in older adults requires coordinated efforts involving individuals, families, and communities through proactive therapeutic interventions.

In conclusion, this study underscores the importance of stress management for both depression and QOL in older adults. Mental health programs tailored to regional needs should aim to reduce stress and enhance perception of happiness among older adults.

Additionally, individuals reporting good subjective health and oral health were less likely to experience depression. As studies have suggested that individuals with positive overall health assessments are more likely to evaluate their oral health positively and vice versa [13], a positive outlook may not only promote overall health, but also help manage depression.

The cross-sectional nature of this study limits its ability to establish causal relationships and limits the choice of variables when analyzing the relationship between oral health and QOL in older adults. Future research should use longitudinal studies to analyze the method of examination of how oral health and QOL evolve over time and how these changes impact depressive symptoms. Furthermore, incorporating a wider range of demographic variables could enable more nuanced investigations into factors that improve QOL in older adults.

Despite these limitations, the strength of this study is in its use of nationally representative data from the 2022 Korea CHS, involving a large sample size that ensures high reliability and representativeness compared to those in previous studies. Unlike earlier studies focusing on isolated factors such as QOL or oral health, this study provides a comprehensive analysis of how these factors interrelate with mental health. Additionally, the application of a complex sampling design enhances the accuracy and reliability of the findings.

Conclusions

This study analyzed the relationship between HRQOL, oral health, and depression in 79,441 older adults using raw data from the 2022 Korea CHS conducted by the KDCA. The key findings are as follows:

1. The study population comprised 57.2% women and 42.8% men. Poor subjective oral health was reported more frequently (48.6%) than poor subjective health (36.6%), with 34.8% experiencing chewing discomfort.

2. Older adults in the low HRQOL group were statistically more likely to experience issues such as pain/discomfort and difficulties with daily activities, self-care, mobility, and anxiety/depression compared to the normal HRQOL group. This group also had higher levels of stress, depressive symptoms, suicidal ideation, cognitive impairment, and difficulty in chewing.

3. Predictors of increased risk of depression included stress, suicidal ideation, chewing discomfort, and cognitive impairment. Conversely, factors associated with a reduced likelihood of depression included happiness, good subjective health, good subjective oral health, and vigorous and moderate physical activities. The model explained approximately 32.0% of the variance in the risk of depression.

These findings highlight the importance of promoting overall health and supporting daily activities to improve QOL among older adults. Enhancing happiness and fostering positive health perceptions are also critical in reducing depression, particularly late-life depression. Additionally, as stress plays a significant role in QOL, future studies should explore stress factors affecting older adults from multiple perspectives.

Notes

Author Contributions

Conceptualization: SM Lee; HH Min; Data collection: SM Lee; Formal analysis: SM Lee; Writing-original draft: SM Lee, MS Shin; Writing-review&editing: SM Lee, MS Shin

Conflicts of Interest

The authors declared no conflicts of interest.

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Ethical Statement

None.

Data Availability

Data can be obtained from the corresponding author.

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65세 이상 노인의 건강관련 삶의 질, 구강건강 및 우울증과의 관계

초록

연구목적: 65세 이상 노인의 건강 관련 삶의 질과 구강건강이 우울감에 미치는 영향을 연구하여, 노인 우울증 예방 및 삶의 질 개선 방안을 모색하고자 하였다. **연구방법:** 2022년 질병관리청의 전국 지역사회건강조사 데이터를 활용해 65세 이상 79,441명을 대상으로 연구를 수행하였다. 연령, 성별, 결혼상태, 주관적 건강, 구강건강, 저작불편 등의 인구통계학적 자료를 수집하고, EQ-5D로 건강 관련 삶의 질을 평가하였다. **연구결과:** 연구 대상자 중 여성 57.2%, 남성 42.8%로, 구강건강상태는 주관적 건강상태보다 나쁘게 인식되었다. 삶의 질이 낮은 집단은 다양한 건강 문제를 더 많이 겪었으며, 우울감에는 스트레스, 자살 충동 등이 영향을 미쳤고, 행복감과 주관적 건강 상태는 우울감을 감소시키는 요인으로 나타났다. **결론:** 노년기 행복감과 건강에 대한 긍정적 사고는 우울증 감소에 중요한 요인이며, 삶의 질 향상을 위해 스트레스 관리가 필수적이므로 노인의 스트레스 요인에 대한 심층 분석이 필요하다.

색인: 우울증, 노인, 저작 불편, 구강건강, 삶의 질