Research Paper

Oral Problems and Psychological Status of Older Adults Referred to Hospital and Its Relationship With Cognition Status, Stress, Anxiety, and Depression

Shahab Papi[1], Seyed Vahid Hosseini[2], Farzaneh Bahadori[2], Vahideh Rezapour[3], Amir Mohamad Moghadasi[4], Reza FadayeVatan[5,6*]

1. Department of Public Health, Psychiatry and Behavioral Sciences Research Center, School of Health, Addiction Institute, Mazandaran University of Medical Sciences, Sari, Iran.
2. Department of Geriatrics, Research Center on Aging, School of Social Welfare, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.
3. Department of Public Health, School of public Health and Safety, Shahid Beheshti University of Medical Sciences, Tehran, Iran
4. Department of Health Education And Promotion, Tabriz University of Medical Sciences, Tabriz, Iran.
5. Department of Geriatrics, Research Center on Aging, School of Social Welfare, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.
6. Clinical Gerontologist, Vice-chancellor of Azad University in Oxford and Dubai, Dubai.

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ABSTRACT

Background and Purpose: Oral health is a critical factor in the quality of life (QoL) of older adults in relation to their nutrition, mental health, and healthy social relationships. This study aimed to investigate oral problems and psychological status of older adults referred to a hospital and its relationship with cognition status, stress, anxiety, and depression.

Materials and Methods: This cross-sectional study was conducted among 300 older adults referred to Shahid Beheshti Hospital in Shiraz City, Iran. The "Depression, Anxiety, Stress Scale", the "Abbreviated Mental Test score", and the "General Oral Health Assessment Index" were used to collect the required data. The Pearson correlation and multiple linear regression statistical tests were used to analyze the data in SPSS v. 26. P less than 0.05 were considered significant.

Results: The Mean±SD age of the participants was 70.1±4.6 years. Their Mean±SD score of oral health was 44.83±3.91, and the Mean±SD cognitive status was 9.28±0.9. The results of correlation analysis revealed a significant relationship between the dimensions of mental health (cognitive status, stress, anxiety, depression) and oral health (P<0.05). According to the multiple linear regression model, there was a significant relationship between oral health and cognitive status (P=0.002) and between oral health and stress (P=0.015).

Conclusion: The study's results showed a correlation between mental health and oral health. Thus, one of the ways to improve the mental health of the elderly is to provide appropriate and timely dental intervention.

Keywords: Oral health, Cognition status, Stress, Anxiety, Depression

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*** Corresponding Author:**
Reza FadayeVatan, PhD.
Address: *Department of Geriatrics, Research Center on Aging, School of Social Welfare, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran.*
Tel: *+98 (21) 2218004*
E-mail: *reza1092@yahoo.com*

1. Introduction

Oral health is an integral part of a person's general health and affects all aspects of personal, social, and psychological life, especially in older adults. Oral health directly affects the body and mind of people. Poor oral health plays a major role in the quality of life of older adults and their health. Social interactions, diet type, weight, appearance, and eating ability affect oral health. Oral health affects not only older adults but also caregivers and others around them [1, 2]. The daily habits and behavior of older adults directly affect their oral status, and behaviors such as smoking and eating unhealthy foods affect the oral health of older adults [2, 3]. A common definition of oral health is the absence of physical diseases in the mouth [4].

Older adults are exposed to various diseases due to physiological and pathological changes. Weak immune systems, chronic diseases, and an increased need for multiple drugs are some of the factors that systematically threaten these people. Some topical factors, such as the use of artificial teeth, threaten the health of the oral mucosa [5]. With increasing age, changes in the mental health of older adults, such as mental distress, occur. Increased mental distress in older adults negatively impacts health-related behaviors such as eating patterns and behaviors related to oral health, ultimately leading to oral problems in them [6-8]. There is a strong association between oral health and mental health. About half of all patients experience anxiety during a dental visit, which can lead to phobias or fear of going to the dentist. These people become anxious even for a simple oral examination by a dentist. Fear of receiving dental services may be due to unpleasant experiences with dental equipment such as needles. This fear might cause a person to avoid the dentist and lead to severe oral problems (gum disease, premature loss of teeth) and physical problems such as cardiovascular disease or a lung infection [9, 10].

There is a two-way relationship between mental health and oral health, and poor oral health can harm one's mental health. Unfavorable oral health affects appearance, self-esteem, and body perception. Also, patients with depression show fatigue, lack of interest or motivation to take care of themselves, and reduced level of oral health, which leads to an increase in the rate of tooth decay and periodontal diseases [11]. Older adults have poor oral health. A high prevalence of periodontal disease and tooth decay leads to tooth loss. Oral problems have different psychological factors that, in turn, can affect the progression of the disease [12]. Psychologically, tooth loss greatly impacts a person's life and decrease self-esteem. These consequences change the patterns of social behavior because older people do not participate in social gatherings due to a lack of teeth and this factor also leads to social isolation in the person [13-15].

There is still not enough information about oral health in older adults. This lack of information might be because older adults have been studied less in epidemiological studies. Examining the oral health of older adults is also an important issue in society. However, in previous studies, the relationship between depression and cognitive status in older adults has been investigated separately [14, 16]. No research has been conducted so far to examine the relationship of variables of stress, anxiety, and depression with oral health status and the interaction role of these factors with each other among older adults. Also, in the present study, other predictors related to oral health are investigated. Therefore, the present study aimed to investigate the relationship between oral problems and psychological status among older adults referred to a hospital and its relationship with cognition status, stress, anxiety, and depression.

2. Materials and Methods

The present descriptive-analytical study was conducted among older adults referred to the outpatient ward of Shahid Beheshti Hospital in Shiraz City, Iran, in 2020. The sample size was estimated at 300 based on the study by Papi et al. [2], considering a 51% prevalence of tooth decay, a 95% confidence interval, and an acceptable error rate of 0.05. The researcher selected the elderly referring to the hospital clinic who met the inclusion criteria in a goal-based manner. After obtaining informed consent from the participants, the study questionnaires were distributed to the participants for completion, and if the elderly needed help complete the questionnaire, the researcher would help them. Older adults with inclusion criteria were selected using a convenience sampling method. The inclusion criteria were as follows: older adults aged 60 years and older, willing to participate in the study, and people who could speak and communicate. The exclusion criterion was incomplete completion of questionnaires.

A demographic questionnaire, general oral health assessment index (GOHAI), depression anxiety stress scale (DASS), and abbreviated mental test scores (AMTs) were used to collect the required information. The demographic researcher-made questionnaire in-

cluded age, gender, level of education, income status, number of children, the children's residence, occupation, chronic illness, and smoking history. GOHAI index has been used to assess oral health status. Dolan and Atchison introduced this tool in 1990 [17]. The validity and reliability of its Persian version have been confirmed by Rezaei et al. [18]. The index assesses three areas of physical function, psychosocial function, and pain over the past 3 months. It has 12 questions scored on the 5-point Likert scale with the options of "never", "rarely", "sometimes", often", and" always." Its total score is between 12 and 60. A lower total score indicates a poor oral health status, while a higher score indicates a good oral health status [3].

This test was first validated in Iran by Sahebi et al. in 2005. The internal consistency of test subscales through the Cronbach alpha coefficient was calculated, and its values were obtained at 77% for depression, 79% for anxiety, and 78% for stress [19]. The DASS Scale is a set of three reporting scales for assessing negative emotion states in depression, anxiety, and stress. It contains 21 questions that assess stress (7 questions), anxiety (7 questions), and depression (7 questions). The validity and reliability of this questionnaire in Iran have been evaluated by Samani and Jowkar (2007), and test-retest reliability values for depression, anxiety, and stress were reported at 0.80, 0.76, and 0.77, respectively. Also, the Cronbach alpha for depression, anxiety, and stress was reported at 0.81, 0.74, and 0.78, respectively [20].

The AMT includes 10 items first extracted by Hodkinson in 1972 from the 37-item Roth Hopkins test . Also, it shows a good correlation with pathological brain diseases at autopsy. He separated the components of the test mentioned above that had the best discrimination power for the AMT. Hodkinson and Qureshi determined its sensitivity and specificity in a study. The Persian version of the AMT was validated by Foroughan et al. (2014) in older adults, and its validity and reliability were reported at an acceptable level (the Cronbach alpha coefficient was 0.76), and the cut-off point was determined at 7 based on DSM IV [21]. After completing and collecting the questionnaires, the data entered the SPSS v. 26, and the Pearson correlation and multiple linear regression statistical tests were used to analyze the data. The covariance was also used to control confounding variables. A significance level of 0.05 was determined.

3. Results

The Mean±SD age of participants was 70.1±4.61 years, and 58.3% of the participants were male. About 8% of the participants were illiterate, and 15% had a diploma and higher level of education (Table 1). Also, 20.7% of the participants were self-employed, 31.7% were retired, and 20.7% were pensioners. About 54% of the older adults mentioned their monthly income less than 5000000 Iranians Rials. Chronic diseases in older adults included heart disease (17%), diabetes (22%), hypertension (20.3%), neurosis (6.7%), low back pain (6.3%), osteoporosis [8], knee pain (6.7%), prostate (6.3%), kidney stones (5%), and thyroid disease (4.7%). Also, 69.7% of the older adults did not smoke at all. It should be noted that 98.3% of the older adults did not have cognitive impairment.

Their Mean±SD score of oral health was 44.85±3.91. The highest and lowest scores belonged to the "physical" (24.08±2.74) and "pain" dimensions (5.73±1.32), respectively (Table 1).

The results showed that the older adults in the study, in terms of depression, anxiety, and stress, are at the normal level. In general, they are at the desired level in terms of mental health variables. They also have no cognitive impairment (Table 2).

Correlation analysis showed a significant relationship between the dimensions of psychological status (cognitive status, stress, anxiety, and depression) and oral health (P<0.05) (Table 3).

Table 1. Mean±SD of total score and subscales of oral health

Variables	Mean±SD
Total score	85.44±91.3
Physical	08.24±74.2
Psychosocial	29.1±03.15
Pain	73.5±32.1

Table 2. Mean±SD of depression, anxiety, stress, and cognitive status

Variables	Mean±SD
Depression	58.3±66.2
Anxiety	02.3±62.2
Stress	92.5±04.3
Cognitive status	28.9±90.0

Table 3. The Pearson correlation between psychological status and oral health

Variables		Stress	Anxiety	Depression	Cognitive Status
Oral health	Coefficient of correlation	-0.35	-0.34	-0.33	0.22
	Sig.	<0.001	<0.001	<0.001	<0.001

The results of a multiple linear regression model to investigate the relationship between oral health and mental health (cognitive status, depression, stress, and anxiety) showed that oral health and cognitive status have a significant relationship (P=0.002). It means that by assuming that other variables in the model are constant, oral health increases by 7 units as cognitive status increases by 10 units. Also, there is a significant relationship between oral health and stress (P=0.015). According the multiple linear regression models, by assuming that other variables in the model are constant, oral health is reduced by 2.7 units as stress increases by 10 units (Table 4).

4. Discussion

The present study aimed to investigate the relationship between oral problems and psychological status among older adults referred to the hospital and its relationship with cognition status, stress, anxiety, and depression. In the present study, the Mean±SD oral health score was 44.85±3.91. The Mean±SD score of oral health in the study conducted by Entre gênero was 46.5±8.1, which was consistent with the results of the present study [22]. The mean is almost the same in the two groups of older adults studied, which can be related to the similarity of the socioeconomic status of the older adults in the two areas. However, in the study conducted by Faezi et al. in Tehran, the Mean±SD oral health score was 39.36±10.72 [23], which was lower than the score of oral health in the present study. The difference between the results of the above studies might be related to the effect of air pollution on dental health or dental indicators among older adults because the risk of tooth decay and oral disease increases in areas where the air pollution index is high [24]. Thus, the older adults living in Tehran may have poorer oral health due to air pollution compared to the older adults living in the cities.

In the present study, the Mean±SD score for depression was 3.58± 2.66, the Mean±SD score for stress was 5.92±3.04, and the mean anxiety score was 3.02±2.62. In

Table 4. Multiple linear regression analysis of mental health dimensions on oral health

Variables	Coefficient	Sig.
Cognition status	0.71	0.002
Depression	-0.01	0.934
Stress	-0.27	0.015
Anxiety	-0.21	0.145

a study conducted by Aga Khani et al., the mean score of depression was 57.9±4.28. The possible reason for the difference in the results of the above studies is that the Aga Khani study was conducted among patients referred to psychiatric clinics under the supervision of Shiraz University of Medical Sciences [25]. In general, the mental health status of these people was worse than the older adults in the present study. In the present study, the Mean±SD score of cognitive status was 9.28±0.9. The Mean±SD score of cognitive status in the study conducted by Tanglakmankhong et al. in Taiwan was 8.08±1.39 [26].

One of the possible reasons for the difference between the results of the above studies might be related to the role of Islam and religious beliefs among older adults in Iran compared to the older adults living in Taiwan [27]. Participation in religious rituals leads to increased social interactions among Iranian people, and the expansion of social networks can play a major role in improving the cognitive status of people [28]. In the present study, there was a significant relationship between the cognitive status of older adults and the level of education, which was also observed in the study by Satller et al. [29]. Education can play a protective role against cognitive decline for three reasons. First, having a high level of education increases the brain's ability to cope with negative changes in old age through compensatory mechanisms and slows the decline in cognitive changes, and this hypothesis is sometimes referred to as the "active storage" model. The second reason is that education can delay the onset of cognitive decline by using the brain's auxiliary structures. In other words, these auxiliary structures can prevent the onset of cognitive decline when the basic structures of the brain begin to deteriorate and this hypothesis is known as the neural compensation model. Third, education may only change the level of cognitive function but not the rate of decline thereafter and this hypothesis is sometimes referred as passive storage model [30].

In the present study, there was a significant relationship between stress, anxiety, and oral health status. For every 10 units of increase in stress levels, oral health decreases by 2.7 units. The results of studies conducted by Refulio [31] in Peru and Mudrika [32] in India are consistent with those of the present study. When a person faces a stressful situation, he or she tries to cope with it in various ways, including substance abuse, alcohol, poor diet, and inactivity, and these conditions can lead to oral diseases [33]. It also releases a hormone called cortisol in stressful situations, which weakens the body's immune system and may eventually make the body vulnerable to gingivitis and gum diseases [34]. These factors can lead to oral problems in people.

The results of the present study revealed a significant relationship between depression and oral health status. There is a two-way relationship between mental health status and oral health among older adults. Decreased energy and motivation due to depression can affect oral health due to not paying attention to oral health, leading to an increased risk of periodontal disease, tooth decay, eating foods that cause dental caries, avoiding dental care, and dry mouth due to using antidepressants [16]. Based on the study conducted by Park et al., toothache has been reported in patients with depression. They frequently complain of problems with chewing, periodontal bleeding, and symptoms of the temporomandibular joint [35]. Since people face new conditions in old age, such as reduced work activities, loss of a partner, and loneliness, the prevalence of depression increases. Hence, the likelihood of ignoring oral care becomes more in this period. Mohammadi et al. revealed a significant relationship between depression and lack of oral health [36]. Based on the research conducted by Skośkiewicz-Malinowska et al., among people over 65 years of age, the severity of depression increases with increasing the number of missing teeth, the number of decayed teeth, and dry mouth [16]. The present study showed a relationship between oral and dental problems and cognitive status. Many studies have shown the impact of oral and dental hygiene on general health and systemic diseases, including cognitive disorders such as dementia [37], Alzheimer [38], and mild cognitive impairment [39]. The relationship between oral and dental health and cognitive function can be bidirectional, meaning that poor dental health is both a risk factor and a consequence of cognitive disorders [40]. Poor oral and dental health through inflammatory mechanisms and pro-inflammatory factors can damage nerve cells. On the other hand, cognitive disorders such as dementia, Alzheimer, mild cognitive impairment, delirium, and so on can result in less dental care, more caries, falling teeth, and an increase in gum and tooth inflammatory patients [41, 42].

Study limitations

One of the limitations of the present study is the completion of questionnaires only among the older adults referred to the outpatient clinic, so the mental health status of the older adults living in their own homes and not visiting the clinic was not examined. Accurate assessment of oral diseases by the dentist and completion of relevant indicators such as the number of decayed or extracted and filled teeth has not been done, and the questionnaire has been completed only by the older adults. Also, the present study was conducted only in one of the urban areas of the country, and it is not possible to generalize the results of this study to other deprived areas of the country that have poor socioeconomic status.

5. Conclusion

The results of the present study revealed that cognitive status, depression, anxiety, and stress in older adults play a key role in their oral health status. Therefore, it is necessary for policymakers in the area of older adults' health pay special attention to the mental health of older adults in future planning and to conduct periodic assessments to assess the state of mental health and solve the problems among older adults. By solving the problems related to the mental health status of the older adults, the older adults will be motivated to live and pay more attention to their physical health, especially their oral health status, resulting in their increased life expectancy.

Ethical Considerations

Compliance with ethical guidelines

This study was performed in line with the principles of the Declaration of Helsinki. The Ethics Committee University of Social Welfare and Rehabilitation Sciences, Tehran, Iran approved the study (Code: IR.USWR.REC.1400.078).

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Authors' contributions

Conceptualization and Supervision: Reza FadayeVtan and Shahab Papi; Methodology: Seyed Vahid Hosseini; Investigation, Writing-original draft, and Writing-review & editing: All authors; Data collection: Seyed Vahid Hosseini and Amir Mohamad Moghadasi; Data analysis: Farzaneh Bahadori and Vahideh Rezapour; Funding acquisition and Resources: Reza FadayeVtan; All authors read and approved the final manuscript.

Conflict of interest

The authors declared no conflict of interest.

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References

[1] Ahmadi A, Sahaf R, Rashedi V, Akbari Kamrani AA, Shati M, Delbari A. [Relationship between oral health and demographic characteristics in retired elderly people in Iran (Persian)]. Iranian Journal of Ageing. 2019; 13(4):452-63. [DOI:10.32598/SIJA.13.4.452]

[2] Papi S, Izadi M, Behboodi L, Taheri-Kharameh Z, Hosseini F, Yousefi M, et al. Oral health status in the Iranian elderly: The role of nutrition status and health literacy. Journal of Holistic Nursing and Midwifery. 2021; 31(4):263-70. [DOI:10.32598/jhnm.31.4.2157]

[3] Zamaninejad S, Rashedi V, Malakouti S, Maghsodlou-Estarabadi B. [Oral health status of male older adults admitted to Razi psychiatric hospital, 2016 (Persian)]. Journal of Gerontology. 2017; 2(2):11-7. [DOI:10.29252/joge.2.2.11]

[4] Nabavi N, Salahi S, Shariatmadar Ahmadi A. [Assessment of Oral Health Assessment Index (gohai) validity in Iranian elderly population (Persian)]. Journal of Research in Dental Sciences. 2012; 9(3):161-9. [Link]

[5] Maleki Z, Ghaem Maghami A, Lesan S. [Comparison of Soft Tissue Lesions (ostls) prevalence in elderly institutionalized population who are resided in private and governmental institutes in Tehran Iran (Persian)]. Journal of Dental School Shahid Beheshti University of Medical Science. 2006; 23(4):669. [Link]

[6] Dahl KE, Calogiuri G, Jönsson B. Perceived oral health and its association with symptoms of psychological distress, oral status and socio-demographic characteristics among elderly in Norway. BMC Oral Health. 2018; 18(1):93. [DOI:10.1186/s12903-018-0556-9] [PMID] [PMCID]

[7] Papi S, Cheraghi M. Multiple factors associated with life satisfaction in older adults. Przeglad Menopauzalny= Menopause Review. 2021; 20(1):65-71. [PMID]

[8] Saleh Manige H, Papi S, Sahaf R, Abbasi Asl M, Ramshini M, Rassafiani M, et al. [Predicting the perception of aging based on optimism in the elderly people (Persian)]. Iranian Journal of Ageing. 2020; 14(4):450-61. [Link]

[9] Latif T, Vieira AR. Oral health of individuals with mental health disorders. Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal). 2018; 3(2):19-25. [DOI:10.29327/24816.3.2-4]

[10] Maple Dental Health. Mental health and dental health [Internet]. 2018 [Updated 2018 April 30]. Available from: [Link]

[11] Sarkar S. Psychiatric comorbidities, oral health, and comprehensive care. Oral Health and Care. 2017; 2(2):1-4. [DOI:10.15761/OHC.1000113]

[12] Erazo MR, Yañez ASB. Psychological factors and his influence in the oral health of older people: A narrative review. Journal of Oral Research. 2016; 5(1):43-9. [Link]

[13] Papadaki E, Anastassiadou V. Elderly complete denture wearers: A social approach to tooth loss. Gerodontology. 2012; 29(2):e721-7. [DOI:10.1111/j.1741-2358.2011.00550.x] [PMID]

[14] Patil MS, Patil SB. Geriatric patient-psychological and emotional considerations during dental treatment. Gerodontology. 2009; 26(1):72-7. [DOI:10.1111/j.1741-2358.2008.00245.x] [PMID]

[15] Papi S, Ramezani T, Aalipour R, Naderiyan S, Fadayevatan R, Nazarpour A. [Assessment of physical activity status and its effective factors in elderly people of Khorramabad city (Persian)]. Health and Development Journal. 2019; 8(3):280-91. [Link]

[16] Skośkiewicz-Malinowska K, Malicka B, Ziętek M, Kaczmarek U. Oral health condition and occurrence of depression in the elderly. Medicine. 2018; 97(41):e12490. [PMID] [PMCID]

[17] Atchison KA, Dolan TA. Development of the geriatric oral health assessment index. Journal of Dental Education. 1990; 54(11):680-7. [DOI:10.1002/j.0022-0337.1990.54.11.tb02481.x]

[18] Rezaei M, Rashedi V, Khedmati Morasae E. A Persian version of geriatric oral health assessment index. Gerodontology. 2016; 33(3):335-41. [DOI:10.1111/ger.12161] [PMID]

[19] Alimoradi H, Nazari M, Fallah R, Jafari R, Zare Sakhvidi M J, Ajdani A. [Investigating the relationship between noise and occupation on the status of mental disorders and depression of workers using questionnaire (DASS) and (BAKK) in steel industries (Persian)]. Tibbi- i- kar, a Quarterly Journal. 2021; 13(1):1-14. [DOI:10.18502/tkj.v13i1.6580]

[20] Sahebi A, Asghari MJ, Salari RS. [Validation of depression anxiety and stress scale (DASS-21) for an Iranian population (Persian)]. Journal of Iranian Psychologist. 2015; 1(4):25-42. [Link]

[21] Hassani N, Heravi-Karimooi M, Rejeh N, Ashtiani MH, Sharifnia H, Ghanbari M, et al. [The effect of pilates exercise on quality of life of elderly women with type 2 diabetes (Persian)]. Payesh (Health Monitor). 2018; 17(5):531-9. [Link]

[22] Hernández-Palacios RD, Ramírez-Amador V, Jarillo-Soto EC, Irigoyen-Camacho ME, Mendoza-Núñez VM. Relationship between gender, income and education and self-perceived oral health among elderly Mexicans. An exploratory study. Ciencia & Saude Coletiva. 2015; 20(4):997-1004. [DOI:10.1590/1413-81232015204.00702014] [PMID]

[23] Faezi M, Rejeh N, Soukoti M. [Assessment of oral health in older people referred to selected dentistry schools of universities of Tehran (Persian)]. Journal of Health Promotion Management. 2015; 5(1):1-10. [Link]

[24] Shishniashvili TE, Suladze NN, Margvelashvili VV. Primary teeth and hair as indicators of environmental pollution. Journal of Clinical Pediatric Dentistry. 2016; 40(2):152-5. [DOI:10.17796/1053-4628-40.2.152] [PMID]

[25] Aghakhani N, Vahabzadeh D, Niroomand S, Asgarlii Z, Zaravar F. The relationship between spiritual wellbeing, anxiety and depression in old adults: A cross sectional study of Shiraz clinics, Iran. World Family Medicine Journal: Incorporating the Middle East Journal of Family Medicine. 2018; 16(3):69-72. [Link]

[26] Tanglakmankhong K, Hampstead BM, Ploutz-Snyder RJ, Potempa K. Cognitive screening assessment in Thai older adults: A prospective study of the reliability and validity of the Abbreviated Mental Test. Journal of Health Research. 2022; 36(1):99-109. [DOI:10.1108/JHR-02-2020-0049] [PMID] [PMCID]

[27] Jung J, Lee CH, Shin K, Roh D, Lee SK, Moon YS, et al. Specific association between religiosity and cognitive functions in Alzheimer's Disease. American Journal of Alzheimer's Disease & Other Dementias®. 2019; 34(4):254-60. [DOI:10.1177/1533317519827416] [PMID]

[28] Hikichi H, Kondo K, Takeda T, Kawachi I. Social interaction and cognitive decline: Results of a 7-year community intervention. Alzheimer's & Dementia: Translational Research & Clinical Interventions. 2017; 3(1):23-32. [DOI:10.1016/j.trci.2016.11.003] [PMID] [PMCID]

[29] Sattler C, Toro P, Schönknecht P, Schröder J. Cognitive activity, education and socioeconomic status as preventive factors for mild cognitive impairment and Alzheimer's disease. Psychiatry Research. 2012; 196(1):90-5. [DOI:10.1016/j.psychres.2011.11.012] [PMID]

[30] Berggren R, Nilsson J, Lövdén M. Education does not affect cognitive decline in aging: A Bayesian assessment of the association between education and change in cognitive performance. Frontiers in Psychology. 2018; 9:1138. [DOI:10.3389/fpsyg.2018.01138] [PMID] [PMCID]

[31] Refulio Z, Rocafuerte M, de la Rosa M, Mendoza G, Chambrone L. Association among stress, salivary cortisol levels, and chronic periodontitis. Journal of Periodontal & Implant Science. 2013; 43(2):96-100. [PMID] [PMCID]

[32] Mudrika S, Muthukumar S, Suresh R. Relationship between salivary levels of cortisol and dehydroepiandrosterone levels in saliva and chronic periodontitis. Journal of the International Clinical Dental Research Organization. 2014; 6:92-7. [DOI:10.4103/2231-0754.143488]

[33] Vasiliou A, Shankardass K, Nisenbaum R, Quiñonez C. Current stress and poor oral health. BMC Oral Health. 2016; 16(1):88. [DOI:10.1186/s12903-016-0284-y] [PMID] [PMCID]

[34] Ishisaka A, Ansai T, Soh I, Inenaga K, Yoshida A, Shigeyama C, et al. Association of salivary levels of cortisol and dehydroepiandrosterone with periodontitis in older Japanese adults. Journal of Periodontology. 2007; 78(9):1767-73. [DOI:10.1902/jop.2007.070044] [PMID]

[35] Park HL, O'Connell JE, Thomson RG. A systematic review of cognitive decline in the general elderly population. International Journal of Geriatric Psychiatry. 2003; 18(12):1121-34. [DOI:10.1002/gps.1023] [PMID]

[36] Mohammadi TM, Sabouri A, Sabouri S, Najafipour H. Anxiety, depression, and oral health: A population-based study in Southeast of Iran. Dental Research Journal. 2019; 16(3):139-44. [DOI:10.4103/1735-3327.255748] [PMID] [PMCID]

[37] Daly B, Thompsell A, Sharpling J, Rooney Y, Hillman L, Wanyonyi K, et al. Evidence summary: The relationship between oral health and dementia. British Dental Journal. 2017; 223(11):846-53. [DOI:10.1038/sj.bdj.2017.992] [PMID]

[38] Aragón F, Zea-Sevilla M, Montero J, Sancho P, Corral R, Tejedor C, et al. Oral health in Alzheimer's disease: A multicenter case-control study. Clinical Oral Investigations. 2018; 22(9):3061-70. [DOI:10.1007/s00784-018-2396-z] [PMID]

[39] Holmer J, Eriksdotter M, Schultzberg M, Pussinen PJ, Buhlin K. Association between periodontitis and risk of Alzheimer' s disease, mild cognitive impairment and subjective cognitive decline: A case-control study. Journal of Clinical Periodontology. 2018; 45(11):1287-98. [DOI:10.1111/jcpe.13016] [PMID]

[40] Gil-Montoya JA, Sánchez-Lara I, Carnero-Pardo C, Fornieles-Rubio F, Montes J, Barrios R, et al. Oral hygiene in the elderly with different degrees of cognitive impairment and dementia. Journal of the American Geriatrics Society. 2017; 65(3):642-7. [DOI:10.1111/jgs.14697] [PMID]

[41] Beck JD, Sharp T, Koch GG, Offenbacher S. A 5-year study of attachment loss and tooth loss in community-dwelling older adults. Journal of Periodontal Research. 1997; 32(6):516-23. [DOI:10.1111/j.1600-0765.1997.tb00567.x]

[42] Papi S, Cheraghi M. Relationship between life satisfaction and sleep quality and its dimensions among older adults in city of Qom, Iran. Social Work in Public Health. 2021; 36(4):526-35. [PMID]

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