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Association of Dental Status and Dry Mouth with Mental Health in Elderly Patients

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A B S T R A C T

Objectives: Psychological disorders are prevalent medical conditions that can negatively affect oral health. Due to the increase in the elderly population, and higher risk of psychological conditions in this age group, this study assessed the association of mental health evaluated by the 28-Item General Health Questionnaire (GHQ-28) and oral health in the elderly patients.

Materials and Methods: Overall, 150 elderly patients aged 60 years and higher presenting to the dental clinic of School of Dentistry, Tehran University of Medical Sciences in 2019 participated in this cross-sectional study. Oral and dental examinations were conducted to assess the dental caries status using the decayed, missing, and filled teeth (DMFT) index, number of existing teeth, and self-reported dry mouth. Sociodemographic status, oral hygiene behaviors, and medical history of the participants were also recorded. The GHQ-28 was used to assess their mental health. Data were analyzed by SPSS version 25 using the correlation tests (alpha=0.05).

Results: Of all the participants, 64 (42.7%) were females, and the age range was 60 to 90 years (mean age: 67.56±6.42 years). The mean total GHQ score was 4±3.8. The DMFT score and number of teeth had significant associations with severe depression and social dysfunction (P<0.05). Dry mouth was directly associated with the total GHQ score and anxiety (P<0.05).

Conclusion: Elderly people with severe depression suffered from poor oral health. Comprehensive oral and dental examination and paying close attention to mental health aspects should be considered in regular dental check-ups and oral health promotion programs for the elderly.

Keywords: Aged; Mental Health; Oral Health

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INTRODUCTION

Population aging is a major challenge worldwide. According to the World Health Organization, the population of individuals aged 60 years and older is expected to reach 2 billion by 2050 [1]. Since the psychological and physiological aspects of aging are frequently accompanied by pathological consequences, the elderly may suffer from disability and various mental disorders.

Psychological disorders are prevailing public health problems worldwide [2]. Late-life depression is one of the most prevalent neuropsychiatric diseases in old ages, and

can be a reason for disability [3]. Symptoms of depression in the old age include cognitive impairments (memory loss, positioning disorder, confusion), pseudo-dementia, apathy, and distraction [4].

The prevalence of mental disorders was 23.4% in Iran in 2015 [5], and evaluations from 1999 to 2015 showed that susceptibility for these disorders increased with age, and was higher in the elderly people [6]. The most recent report on mental disorders in Tehran capital city revealed an estimated prevalence of 37.1% among the general population [7]. According to a national report from the northwest part of Iran, 38.5% of the elderly population had one or more mental disorders at the time [8].

The oral health of the elderly may be affected by their mental health. Since the risk of mental disorders increases in the old age, the possibility of poor oral health rises as well [9]. Depression and anxiety are significantly associated with increased levels of plaque accumulation and gingivitis, partly due to psycho-immunological mechanisms and the host response to microorganisms [10]. In addition, behavioral changes associated with mental disorders, such as poor compliance with oral hygiene instructions, may cause oral diseases [11]. Dry mouth, which is a major risk factor for dental caries, is a prevalent side effect of the commonly prescribed psychiatric medications such as antidepressants [12].

The caries risk factors among patients with poor mental health may be irregular toothbrushing, frequent consumption of cariogenic carbohydrates, and dental fear or anxiety [13]. The negligence that regularly accompanies mental disorders may perhaps lead to poor general and oral hygiene. Therefore, patients who deal with mental disorders require a careful attention to their oral health.

There are currently four systematic reviews and meta-analyses on the relationship between oral health and mental disorders [14-17], which are mainly limited to severe mental illnesses such as dementia, eating disorders, and schizophrenia [15-17]. Only one of these studies assessed the relationship between oral diseases and common mental disorders [14]. Although these studies showed a connection between mental disorders and oral health, controversies still exist.

The 28-Item General Health Questionnaire (GHQ-28) has been used for valid assessment of mental health since 1979 [18]. The validity of this questionnaire has already been evaluated, and it has been widely used in epidemiological studies [7,19,20].

The present study sought to determine the association of mental health evaluated by the GHQ-28 and oral health among elderly patients, and to further investigate the relationship between oral health-related factors and the GHQ subscales, i.e. somatization, anxiety and insomnia, social dysfunction, and major depression.

MATERIALS AND METHODS

Study design and population:

The population of this cross-sectional, descriptive-analytical study comprised of elderly patients aged 60 years and higher presenting to the School of Dentistry, Tehran University of Medical Sciences in 2019. After explaining the aim and the process of the study, 150 people participated in the study. All the participants gave their verbal and written consent for participation in the study. This study was approved by the Research Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.DENTISTRY.REC.1397.182).

Sample size and sampling method:

The minimum sample size required for this study was calculated to be 150 patients, considering $\alpha=0.05$, $\beta=0.2$, and $d=0.1$. The patients were recruited by convenience sampling.

Demographic, oral, and general health variables were collected. The patients' demographic information included: gender (female/male), age (years), self-rated income level (high, middle, low), living status (with family, alone), and educational level (illiterate, elementary school, high-

school/high-school diploma, Associate degree, Bachelor's degree, Master's degree, or higher). Oral hygiene behaviors included tooth brushing frequency, denture cleaning frequency, denture removal at night, and time of the most recent dental visit.

Oral examinations were performed by a dentist at the Department of Oral medicine. For the dentate participants, the decayed, missing, and filled teeth (DMFT) index, was recorded according to the World Health Organization criteria. Presence of dry mouth and removable denture, and the number of existing teeth in addition to the history of systemic diseases and mental illness were also recoded.

The GHQ-28 was used in this study, which is a well-known screening tool for detection of mental disorders [19]. It includes four subscales of (I) somatization, which is the scale of physical symptoms and general illness (questions 1 to 7), (II) anxiety and insomnia, including worry and sleep disturbances (questions 8 to 14), (III) social dysfunction, which includes the social function disorder (questions 15 to 21), and (IV) major depression, i.e., severe depression (questions 22 to 28). The GHQ-28 is a self-administered questionnaire that assesses the respondent's current mental health status.

The available answer choices for the questions were "not at all", "as usual", "slightly more than usual", and "much more than usual". All the questions were about patients' mental health condition during the previous month. The responses were scored using the GHQ scoring system (0–0–1–1). The total score was calculated for the 28 questions with a minimum of 0 and a maximum of 28 (the poorest state in terms of psychosomatic status). For the subscales, scores ranged from 0 to 7. The validity and reliability of the Persian version of the questionnaire have been previously confirmed by Noorbala et al, [20] and Nazifi et al, [21] indicating that the instrument could be used successfully in epidemiological studies of mental disorders as a screening tool.

Statistical analysis:

Data were analyzed using SPSS version 25. Quantitative variables were described using central dispersion indices. The Pearson's correlation coefficient was used to analyze the relationship between mental health and oral health in the elderly patients. The results were considered statistically significant at a P value<0.05.

RESULTS

Of a total of 150 participants, 64 (43%) were females, and 86 (57%) were males. The age range was 60 to 90 years with a mean age of 67.5±6.4 years. The majority of the participants had elementary school educational level (41%), and 59% of the participants were low-income (Table 1).

Table 1. Demographic information of the participants (n=150)

Variable	Number	Percentage
Gender		
Female	64	43
Male	86	57
Income level		
High	9	6
Middle	52	35
Low	89	59
Educational level		
Illiterate	17	11
Elementary school	61	41
High-school/high-school diploma	44	29
Associate degree	10	7
Bachelor's degree	16	11
Masters' degree or higher	2	1
Living status		
With Family	133	89
Alone	17	11

Table 2 shows the oral health behaviors of the participants. The most commonly reported frequency of tooth brushing was once a day (46%). In terms of cleaning dentures, 97% reported cleaning their dentures; of which, 42% performed it at least once a day.

Table 2. Oral hygiene behaviors and most recent dental visit of the participants (n=150)

Groups	Patients	Behaviors		Number	Percentage
Oral hygiene behavior	Without removable dentures (n=100)	Toothbrushing frequency	Irregularly or never	25	25
			Once a day	46	46
			> Once a day	29	29
	With removable dentures (n=71)	Denture cleaning	Yes	69	97
			No	2	3
		Denture cleaning frequency per day	Once a day	30	42
			Twice a day	6	8
			Three times a day	29	41
			> Three times a day	4	6
			Never	2	3
		Removing dentures at night	Yes	56	79
			No	15	21
Most recent dental visit			In the past year	93	62
			In the past 2-5 years	53	358.4
			Do not remember	4	2.7

Of all the participants, 62% reported visiting a dentist in the past year.

The information on DMFT and number of existing teeth is presented in Table 3. Of all the participants, 50 people (33.3%) were completely edentulous.

Table 3. Maximum, minimum, and mean DMFT, number of teeth, and GHQ-28 scores of the participants (n=150)

Variable	Min	Max	Mean	SD
DMFT	1	32	24.3	6.7
D	0	8	1.7	2.1
M	0	32	19.9	10.1
F	0	17	2.7	3.8
Number of teeth	0	30	9.9	8.8
GHQ-28 total score	0	20	4	3.8
Somatization disorder	0	6	0.63	1.0
Anxiety and insomnia	0	7	1.1	1.3
Social dysfunction	0	6	4.7	1.7
Major depression	0	7	0.8	1.3

Min: Minimum; Max: Maximum; SD: Standard deviation

The mean number of teeth was 9.9±8.8 (range: 0 to 30). The mean DMFT was 24.3±6.7. The mean total and subscale scores of the GHQ-28 are reported in Table 3. The mean total score of GHQ-28 was 4±3.8, and the highest mean score among the four subscales belonged to social dysfunction (mean score of 4.7±1.7).

Table 4 shows the mean (standard deviation) GHQ-28 total and subscale scores based on demographic and oral health behavior variables.

As shown in Table 5, the DMFT index had a direct relationship with major depression ($P<0.01$), and social dysfunction ($P=0.02$), such that increased severity of depression and social dysfunction was associated with an increase in DMFT score. No relationship was found between the DMFT score and the GHQ-28 total score, somatization, or anxiety and insomnia ($P>0.01$). The results revealed that the GHQ-28 total score, social dysfunction score, and major depression score had significant inverse associations with the number of teeth, i.e. the higher the scores, the lower was the number of existing teeth in the participants ($P<0.05$).

Table 4. Mean (standard deviation) GHQ-28 total and subscale scores based on demographic and oral health behavior variables

Groups	GHQ-28	P value	Somatization	P value	Anxiety	P value	Social dysfunction	P value	Major depression	P value
Gender										
Female	4.97 (3.8)	0.01*	0.89 (1.07)	0.00*	1.78 (1.43)	0.03*	1.27 (1.28)	0.40	1.03 (1.53)	0.08
Male	3.41 (3.8)		0.43 (0.09)		1.26 (1.59)		1.08 (1.34)		0.64 (1.22)	
Income level										
Low	4.97 (4.27)		0.83 (1.18)		1.88 (1.71)		1.29 (1.29)		0.97 (1.52)	
Middle	2.98 (2.85)	0.00*	0.35 (0.55)	0.00*	0.92 (1.06)	0.00*	1.04 (1.40)	0.20	0.67 (1.15)	0.09
High	1.56 (1.59)		0.22 (0.44)		0.78 (0.66)		0.56 (0.88)		0 (0)	
Educational level										
Illiterate/ elementary	4.45 (4.11)		0.60 (1.09)		1.59 (1.61)		1.35 (1.33)		0.91 (1.48)	
High-school/ diploma	3.80 (3.54)	0.44	0.68 (0.98)	0.91	1.36 (1.34)	0.66	1.16 (1.49)	0.05	0.59 (1.06)	0.46
Associate/ Bachelor/ higher	3.46 (3.66)		0.61 (0.78)		1.36 (1.66)		0.64 (0.78)		0.86 (1.48)	
Living status										
With family	3.99 (3.80)	0.47	0.60 (0.99)	0.39	1.46 (1.52)	0.63	1.41 (1.35)	0.52	0.80 (1.38)	0.81
Alone	4.71 (4.45)		0.82 (1.13)		1.65 (1.76)		1.35 (0.99)		0.88 (1.31)	
Tooth brushing frequency										
Once a day/ more	3.44 (3.17)	0.45	0.61 (0.88)	0.87	1.35 (1.38)	0.29	0.88 (1.02)	0.00*	0.60 (1.16)	0.06
Irregularly/ never	4.71 (4.39)		0.64 (1.12)		1.61 (1.69)		1.44 (1.51)		1.01 (1.53)	
Denture cleaning frequency										
Once a day/more	4.74 (4.51)	0.05	0.72 (1.18)	0.27	1.71 (1.67)	0.09	1.20 (1.25)	0.71	1.10 (1.61)	0.01*
Never	3.51 (3.15)		0.54 (0.82)		1.28 (1.40)		1.12 (1.38)		0.56 (1.07)	
Most recent dental visit										
Once in the past year/more	4.02 (4.03)	0.83	0.77 (1.12)	0.21	1.48 (1.63)	0.96	1.00 (1.13)	0.05	0.76 (1.29)	0.62
None	4.16 (3.62)		0.39 (0.72)		1.47 (1.39)		1.42 (1.55)		0.88 (1.50)	

* Significant at 0.05 level

Table 5. Relationship of DMFT, number of teeth, and dry mouth with the total and subscale scores of the GHQ-28

Groups	Statistical measures	Number of teeth	DMFT	Dry mouth
Somatization	Pearson's correlation coefficient	- 0.02	-0.01	0.14
	P value	0.77	0.84	0.06
Anxiety and insomnia	Pearson's correlation coefficient	- 0.12	0.07	0.17
	P value	0.13	0.36	0.03*
Social dysfunction	Pearson's correlation coefficient	- 0.23	0.17	0.15
	P value	0.00*	0.02*	0.05
Major depression	Pearson's correlation coefficient	- 0.22	0.20	0.11
	P value	0.00*	0.01*	0.15
GHQ-28 total score	Pearson's correlation coefficient	- 0.21	0.15	0.20
	P value	0.00*	0.05	0.01*

* Correlation is significant at 0.05 level (2-tailed).

DISCUSSION

Psychiatric diseases can lead to poor oral health. People with mental illness, especially severe mental illness, are at higher risk of oral health problems because of poor nutrition and oral hygiene, and financial or other barriers to accessing dental care [22].

This study evaluated the association between mental health, measured by the GHQ-28, and dental status in the elderly. The high prevalence of psychological disorders in elderly patients in Iran reveals the impediments of attainable oral health for the Iranian elderly population beyond poor access to healthcare services and high cost of dental treatments. The present findings revealed that the total score of GHQ-28, and the anxiety and somatization scores were significantly different between males and females, and those with different income levels. This finding is in accordance with the results of some studies indicating that older women may report higher levels of anxiety than men [23,24]. There was a statistically significant difference in the social dysfunction score by the toothbrushing frequency, and also in the major depression score by the frequency of denture cleaning. Those who never brushed their teeth or brushed irregularly reported greater level of social dysfunction. The present results also showed that elderly people who never cleaned their dentures were more likely to suffer from major depression compared to those who cleaned their dentures once or more than once a day. Geraets and Heinz [25] showed that people who experienced higher levels of stress and lower levels of life-satisfaction, and had higher mental health complaints were less likely to regularly brush their teeth. Somatic health complaints did not decrease the likelihood of regular toothbrushing [25].

No association was found in GHQ-28 subscales and most recent dental visit in the present study. Many studies reported a lower rate of visits among depressed people [26,27,28]. In general, several mental disorders that lead to loss of occupational productivity and related financial problems may inhibit routine dental visits, resulting in overall health neglect [29].

The mean DMFT of the study population was 24.3. This is in line with a study that reported people with severe mental illnesses in Western countries had DMFT scores of more than 20 [30]. However, DMFT scores in countries with non-Western diets such as Ethiopia and India are considerably lower [31]. The present results revealed that the DMFT score was associated with major depression in elderly patients, i.e. the number of decayed, filled, and missing teeth was amplified by increasing the severity of depression. Similarly, McFarland and Inglehart [32] concluded that severe depression was associated with more decayed teeth. Based on a study conducted by Skośkiewicz-Malinowska et al, [33] among

people over 65 years of age, the severity of depression increased with increasing the number of missing and decayed teeth, and dry mouth due to using antidepressants. Findings of other studies showed that anxiety, stress, and depression were associated with having one or more decayed teeth [34,35]. It was also found that people with depressive or anxiety disorders were more likely to lose their teeth compared to other people [34,].

Additionally, a direct association has been observed between psychological problems and root caries in the elderly [34,]. A recent systematic review showed that depression increased the risk of dental caries [odds ratio (OR):1.27], tooth loss (OR:1.31) and edentulism (OR:1.17). Conversely, edentulism (OR:1.28) and periodontal disease (OR:1.73) increased the risk of depression [35]. This mutual relationship indicates the importance of preventive measures and oral hygiene education in patients with depression, and also the psychological effect of poor oral health [36].

Stress and anxiety can exacerbate oral health problems and also dry mouth [37]. The current findings indicated that dry mouth was directly and significantly associated with the GHQ-28 total score, as well as anxiety and insomnia scores. According to previous studies, anxiety and fear may affect saliva secretion related to xerostomia [38]. Xerostomia may be a side effect of commonly used psychotropic medications, particularly those with anticholinergic effects [39]. Clinicians should be aware of dry mouth problems and provide timely diagnosis and early interventions to prevent negative consequences of dry mouth in elderly individuals.

Effective oral care is necessary for maintaining the oral health of patients with mental problems [40]. When caring for patients with mental health disorders, it is essential to consider oral health care as an essential part of their daily tasks and provide necessary nursing support.

This study had some limitations. First, the study participants were selected from one center (dental school clinic), which may cause sampling bias. Dental school clinic is a place where usually people with low to moderate socioeconomic status are referred to. Low socioeconomic status could simultaneously affect the oral health status and the psychological status. It is recommended to assess the influence of socio-demographic characteristics in forthcoming studies. Second, due to the cross-sectional design of the study, causal inferences could not be made. The next step could be to verify the causal effect of mental health on oral health among the elderly population in cohort studies.

CONCLUSION

The current study showed a relationship between oral health and mental health of the elderly. Regular dental visits should be emphasized in order to improve the oral health status of the elders who suffer from mental disorders. Oral health professionals should be aware of the risks encountered by the elderly population struggled with poor mental health, in order to be able to assist and guide patients in managing and controlling risky behaviors.

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CONFLICT OF INTEREST STATEMENT

None declared.

REFERENCES

1. World Health Organization (WHO). Aging and Health, key facts. Available at: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health , accessed on: 12.03.2.23.
2. World Health Organization (WHO). World mental health report: transforming mental health for all. Geneva: World Health Organization, 2022. Available at: https://www.who.int/publications/i/item/9789240049338, accessed on: 07.06.2.23
3. Hall CA, Reynolds-Iii CF. Late-life depression in the primary care setting: challenges, collaborative care, and prevention. Maturitas. 2014 Oct;79(2):147-52.

4. Köhler S, Thomas AJ, Barnett NA, O'Brien JT. The pattern and course of cognitive impairment in late-life depression. Psychol Med. 2010 Apr;40(4):591-602.
5. Noorbala AA, Faghihzadeh S, Kamali K, Bagheri Yazdi SA, Hajebi A, Mousavi MT, et al. Mental health survey of the Iranian adult population in 2015. Arch Iran Med. 2017 Mar;20(3):128-34.
6. Noorbala AA, Bagheri Yazdi SA, Faghihzadeh S, Kamali K, Faghihzadeh E, Hajebi A, et al. Trends of mental health status in Iranian population aged 15 and above between 1999 and 2015. Arch Iran Med. 2017 Nov;20(11 Suppl. 1):S2-6.
7. Bahrami M, Jalali A, Ayati A, Shafiee A, Alaedini F, Saadat S, et al. Epidemiology of mental health disorders in the citizens of Tehran: a report from Tehran Cohort Study. BMC Psychiatry. 2023 Apr;23(1):267.
8. Fakhari A, Herizchi S, Sadeghi-Bazargani H, Amiri S, Noorazar SG, Mirzajanzade M, et al. Prevalence of psychiatric disorders in the aging population in the northeastern of Iran. Middle East Curr Psychiatr. 2023 Mar;30(1):25.
9. Choi J, Price J, Ryder S, Siskind D, Solmi M, Kisely S. Prevalence of dental disorders among people with mental illness: An umbrella review. Aust N Z J Psychiatry. 2022 Aug;56(8):949-63.
10. Hugo FN, Hilgert JB, Bozzetti MC, Bandeira DR, Gonçalves TR, Pawlowski J, et al. Chronic stress, depression, and cortisol levels as risk indicators of elevated plaque and gingivitis levels in individuals aged 50 years and older. J Periodontol. 2006 Jun;77(6):1008-14.
11. Anttila S, Knuuttila M, Ylöstalo P, Joukamaa M. Symptoms of depression and anxiety in relation to dental health behavior and self-perceived dental treatment need. Eur J Oral Sci. 2006 Apr;114(2):109-14.
12. Teoh CXW, Thng M, Lau S, Taing MW, Chaw SY, Siskind D, et al. Dry mouth effects from drugs used for depression, anxiety, schizophrenia and bipolar mood disorder in adults: systematic review. BJPsych Open. 2023 Mar;9(2):e53.
13. Stepović M, Stajić D, Rajković Z, Maričić M, Sekulić M. Barriers affecting the oral health of people diagnosed with depression: A systematic review. Zdr Varst. 2020 Oct;59(4):273-80.
14. Kisely S, Sawyer E, Siskind D, Lalloo R. The oral health of people with anxiety and depressive disorders - a systematic review and meta-analysis. J Affect Disord. 2016 Aug;200:119-32.
15. Kisely S, Baghaie H, Lalloo R, Johnson NW. Association between poor oral health and eating disorders: systematic review and meta-analysis. Br J Psychiatry. 2015 Oct;207(4):299-305.
16. Kisely S, Baghaie H, Lalloo R, Siskind D, Johnson NW. A systematic review and meta-analysis of the association between poor oral health and severe mental illness. Psychosom Med. 2015 Jan;77(1):83-92.
17. Kisely S, Quek LH, Pais J, Lalloo R, Johnson NW, Lawrence D. Advanced dental disease in people with severe mental illness: systematic review and meta-analysis. Br J Psychiatry. 2011 Sep;199(3):187-93.
18. Goldberg DP, Hillier VF. A scaled version of the General Health Questionnaire. Psychol Med. 1979 Feb;9(1):139-45.
19. Malakouti SK, Fatollahi P, Mirabzadeh A, Zandi T. Reliability, validity and factor structure of the GHQ-28 used among elderly Iranians. Int Psychogeriatr. 2007 Aug;19(4):623-34.
20. Noorbala AA, Bagheri Yazdi SA, Yasamy MT, Mohammad K. Mental health survey of the adult population in Iran. Br J Psychiatry. 2004 Jan;184:70-3.
21. Nazifi M, Mokarami H, Akbaritabar A, Faraji Kujerdi M, Tabrizi R, Rahi A. Reliability, validity and factor structure of the Persian translation of General Health Questionnaire (GHQ-28) in hospitals of Kerman University of Medical Sciences. J Fasa Univ Med Sci. 2013 Dec;3(4):336-42.
22. Lewis S, Jagger RG, Treasure E. The oral health of psychiatric in-patients in South Wales. Spec Care Dentist. 2001 Sep-Oct;21(5):182-6.
23. Zana A. Attitude to death and changes of death image in Hungarian society. Study of the differences in generational value-judgments and of the possibilities of measurement. Is death still a taboo?. Orvosi Hetilap. 2009 Jun;150(25):1183-7.
24. Neimeyer RA, Fortner BV. Death anxiety in the elderly. Encyclopedia of aging. 1995;2:252-3.
25. Geraets AF, Heinz A. The association of adolescents' mental health with oral health behavior: The Luxembourg Health Behavior in School-Aged Children study. Front Dent Med. 2022 Oct;3:979192.
26. Okoro CA, Strine TW, Eke PI, Dhingra SS, Balluz LS. The association between depression and anxiety and use of oral health services and tooth loss. Community Dent Oral Epidemiol. 2012 Apr;40(2):134-44.
27. Anttila S, Knuuttila M, Ylöstalo P, Joukamaa M. Symptoms of depression and anxiety in relation to dental health behavior and self-perceived dental treatment need. Eur J Oral Sci. 2006 Apr;114(2):109-14.
28. Tiwari T, Kelly A, Randall CL, Tranby E, Franstve-Hawley J. Association Between Mental Health and Oral Health Status and Care Utilization.

Front Oral Health. 2022 Feb 7;2:732882.
29. Afonso-Souza G, Nadanovsky P, Chor D, Faerstein E, Werneck GL, Lopes CS. Association between routine visits for dental checkup and self-perceived oral health in an adult population in Rio de Janeiro: the Pró-Saúde Study. Community Dent Oral Epidemiol. 2007 Oct;35(5):393-400.
30. Adam H, Preston AJ. The oral health of individuals with dementia in nursing homes. Gerodontology. 2006 Jun;23(2):99-105.
31. Kisely S, Baghaie H, Lalloo R, Siskind D, Johnson NW. A systematic review and meta-analysis of the association between poor oral health and severe mental illness. Psychosom Med. 2015 Jan;77(1):83-92.
32. McFarland ML, Inglehart MR. Depression, self-efficacy, and oral health: an exploration. Ohdmbsc. 2010 Dec;9(4):214-2.
33. Skośkiewicz-Malinowska K, Malicka B, Ziętek M, Kaczmarek U. Oral health condition and occurrence of depression in the elderly. Medicine (Baltimore). 2018 Oct;97(41):e12490.
34. D'Avila OP, Wendland E, Hilgert JB, Padilha DMP, Hugo FN. Association between Root Caries and Depressive Symptoms among Elders in Carlos Barbosa, RS, Brazil. Braz Dent J. 2017 Jan-Apr;28(2):234-40.
35. Cademartori MG, Gastal MT, Nascimento GG, Demarco FF, Corrêa MB. Is depression associated with oral health outcomes in adults and elders? A systematic review and meta-analysis. Clin Oral Investig. 2018 Nov;22(8):2685-702.
36. Datta D, Kumar SG, Narayanan A, Selvamary LA, Sujatha A. Depression and oral health. Int J Curr Res. 2018;10:66561-4.
37. Anil S, Vellappally S, Hashem M, Preethanath RS, Patil S, Samaranayake LP. Xerostomia in geriatric patients: a burgeoning global concern. J Investig Clin Dent. 2016 Feb;7(1):5-12.
38. Sutarjo FN, Rinthani MF, Brahmanikanya GL, Parmadiati AE, Radhitia D, Mahdani FY. Common precipitating factors of xerostomia in elderly. J Health Allied Sci NU. 2024 Jan;14(01):011-6.
39. Page MM. Psychotropic drugs and dentistry. Aust Prescr. 2007 Aug;30(4):98.
40. Dagnew ZA, Abraham IA, Beraki GG, Tesfamariam EH, Mittler S, Tesfamichael YZ. Nurses' attitude towards oral care and their practicing level for hospitalized patients in Orotta National Referral Hospital, Asmara-Eritrea: a cross-sectional study. BMC Nurs. 2020 Jul;19:63.