MÜSBED 2012;2(Suppl. 1):S8-S14

Araştırma / Original Paper

Evaluation of Effects of The Psychological Factors on Saliva

M. Oğuz Borahan, Filiz Namdar Pekiner, Turhan Atalay

Marmara University, Faculty of Dentistry, Department of Oral Diagnosis and Radiology, Istanbul - Turkey

Yazışma Adresi / Address reprint requests to: M. Oğuz Borahan
Marmara University, Faculty of Dentistry, Department of Oral Diagnosis and Radiology, Guzelbahce Buyukciftlik Sok. No: 6 Nisantasi 34365 Istanbul - Turkey
Telefon / Phone: +90-212-231-9120 Faks / Fax: +90-212-246-5247 Elektronik posta adresi / E-mail address: oguzborahan@hotmail.com
Kabul tarihi / Date of acceptance: 03 Haziran 2012 / June 03, 2012

ÖZET

Psikolojik faktörlerin tükürük üzerine olan etkilerinin incelenmesi

Amaç: Bu çalışmanın amacı uyarılmamış tükürük akış hızı ve subjektif ağız kuruluğunun anksiyete, depresyon ve stres ile ilişkilerinin değerlendirilmesidir.

Yöntemler: Dört grup oluşturulmuştur. Birinci grup uyarılmamış tükürük akış hızı ≤0,1 ml/dak. olan ve subjektif ağız kuruluğu olan hastaları, ikinci grup uyarılmamış tükürük akış hızı ≥0,1 ml/dak. olan ve subjektif ağız kuruluğu olan hastaları, üçüncü grup uyarılmamış tükürük akış hızı ≤0,1 ml/dak. olan ve subjektif ağız kuruluğu olmayan hastaları içermektedir. Bu üç grup, uyarılmamış tükürük akış hızı ≥0,1 ml/dak. ve subjektif ağız kuruluğu olmayan hastaları içeren kontrol grubu (dördüncü grup) ile bağımsız olarak karşılaştırılmıştır. Çalışmaya dâhil edilen hastaların tümünün teşhis edilmiş hastalıkları ve kullanmakta oldukları ilaçlar kaydedilmiştir. Tükürük örneğinin alınmasından sonra, depresyon, anksiyete ve genel stres durumu değerlendirilmiştir. Uyarılmamış tükürük akış hızı 0,1 ml/dak.'dan az olduğunda hiposalivasyon olarak değerlendirilmiştir. "Ağzınızda genelde kuruluk hisseder misiniz?" sorusu subjektif ağız kuruluğunun göstergesi olarak sorulmuştur.

Bulgular: Çalışmada kullanılan tüm testlerin iç tutarlılık indekslerinin 0,70 in üzerinde olduğu görülmüştür. Depresyon (F:10,27 p=0,0001), anksiyete (F:3,79 p=0,013, F:3,90 p=0,011) ve stres testlerinin (F:3.88 p=0,012) gruplardaki dağılımında istatistiksel olarak anlamlı fark bulunmuştur. 1. Grup'un depresyon puanları 4. Grup'unkinden istatistiksel olarak anlamlı derecede yüksek bulunmuştur (p=0,0001). 2. Grup'un depresyon puanları 4. Grup'unkinden istatistiksel olarak anlamlı derecede yüksek bulunmuştur (p=0,001).

Sonuç: Psikolojik faktörlerin tükürük akış hızının azalmasında ve subjektif ağız kuruluğunun artmasında önemli rol oynadığı görülmüştür.

Anahtar sözcükler: Subjektif ağız kuruluğu, hiposalivasyon, anksiyete, stres, depresyon

ABSTRACT

Evaluation of effects of the psychological factors on saliva

Objective: The aim of this study is to evaluate the association of anxiety, depression and stress with salivary flow and subjective oral dryness.

Methods: Four groups were formed. First group consisted of patients with unstimulated salivary flow <0,1 ml/min and subjective oral dryness; second group consisted of the patients with unstimulated salivary flow >0,1 ml/min and subjective oral dryness; and third group consisted of the patients with no subjective oral dryness and unstimulated salivary flow <0,1 ml/min. These three groups were independently compared with the control group which consisted of the patients with unstimulated salivary flow >0,1 ml/min and no subjective oral dryness. All diagnosed diseases and medication use were recorded for all participants. After saliva sample collection, depression, state-trait anxiety, and general perceived stress were evaluated. Hyposalivation was defined as an unstimulated salivary flow rate <0,1 mL/min The question "Does your mouth usually feel dry?" was used as an indicator of subjective oral dryness.

Results: It was seen that internal consistency reliability of all tests used in the study were over 0.70. Statistical differences were observed in the scores of depression (F:10,27 p=0,0001), anxiety (F:3,79 p=0,013, F:3,90 p=0,011) and stress scales (F:3.88 p=0,012) of the groups. Depression score of Group 1 was significantly higher than that of Group 4 (p = 0.0001). Depression score of Group 2 was significantly higher than that of Group 4 (p=0,001) .

Conclusion: In our study, depression, anxiety and stress were found to play important roles in decreasing salivary flow rate and increasing subjective oral dryness.

Key words: Subjective oral dryness, hyposalivation, anxiety, stress, depression

INTRODUCTION

Saliva functions as cleanser of oral cavity, helper to digestion of food and bite formation, facilitator of chewing and swallowing, diluter of tissue necrosis and lubricator of food. On the other hand, the buffering action due to its acid neutralization feature, protection of teeth, the preservation of supersaturated concentration of calcium phosphate

when hydroxyapatite crystals are taken into consideration and formation of pellicle on enamel are examples of functions that the unique components of saliva play a role. In addition, salivary components contributes in ensuring the occurrence of the mucosal barrier and antimicrobial activity (1,2). Changes in the functions of saliva can disrupt the integrity of hard and soft tissues of the mouth as well as the oral and gastrointestinal function (3).

Salivary flow rates vary from person to person widely. The normal unstimulated whole salivary flow rate is 0.3 to 0.5 mL/min while the stimulated whole salivary flow rate is 0.5 to 0.7 mL/min. Hyposalivation which results with insufficient amount of saliva or decreased salivary flow is a term based on objectively measured salivary secretion and shows significantly lower flow rate values than those generally considered to be normal values (4). Inadequate saliva secretion often clinically prognosticates the feeling of dry mouth called xerostomia.

Dysfunction due to salivary flow rate may occur for various reasons. Xerostomia is a significant side effect of many drugs which are widely used. Antidepressants, anxiolytic drugs, antihypertensives, diuretics and antihistamines are the particular drugs that cause both xerostomia and hyposalivation the most (5). These drugs may affect water and salt transportation and balance by changing the composition of the salivary glands or affecting different receptors on the salivary glands such as muscarinic cholinergic receptors (6). Xerostomia risk increases depending on the amount of drugs used (7). Therefore, elderly people who require more medications are more affected. If the phenomenon xerostomia is seen with xerophthalmia - known as dryness of the eyes, the disease in question should be considered as Sjögren's syndrome which is a chronic autoimmune disease often seen in women after the age of 40 (8). Some immunological disorders may be accompanied with similar findings to Sjögren's syndrome or xerostomia. At HIV infections, arthritis, parotid gland enlargement and xerostomia are observed (9). Due to end-stage renal disease, in patients receiving hemodialysis treatment xerostomia and decrease in the salivary gland function may be seen (10); this state can be partly committed to the effects of drugs used in reducing the side effects (11). Radiotherapy is applied for treatment of various stages of upper respiratory-digestive tract (primary and recurrent) tumors such as oral cavity, oropharynx, nasopharynx and sinus squamous cell cancers, brain tumours, melanomas, lymphomas, sarcomas and salivary gland tumors. Application of ionizing radiation may damage the major and minor salivary glands and lead to the atrophy of the secretory components; and this situation results in temporary or permanent xerostomia in varying degrees (12).

Depression, anxiety or stress can cause symptoms similar to xerostomia. Depression is a common and serious illness. When an individual has depression, it interferes with daily life and causes pain for both the patient and those who care about him. Many people with a depressive illness never seek treatment. But the majority, even those with the most severe depression, can get better with treatment. Medications, psychotherapies, and other methods can effectively treat people with depression (13). Stress is a term that is commonly used today but has become increasingly difficult to define. It shares, to some extent, common meanings in both the biological and psychological sciences. Stress typically describes a negative concept that can have an impact on one's mental and physical well-being, but it is unclear what exactly defines stress and whether or not stress is a cause, an effect, or the process connecting the two. With organisms as complex as humans, stress can take on entirely concrete or abstract meanings with highly subjective qualities, satisfying definitions of both cause and effect in ways that can be both tangible and intangible (14). Anxiety is a generalized mood that can occur without an identifiable triggering stimulus. As such, it is distinguished from fear, which is an appropriate cognitive and emotional response to a perceived threat. Additionally, fear is related to the specific behaviors of escape and avoidance, whereas anxiety is related to situations perceived as uncontrollable or unavoidable (15). Another view defines anxiety as "a future-oriented mood state in which one is ready or prepared to attempt to cope with upcoming negative events", suggesting that it is a distinction between future and present dangers which divides anxiety and fear (16). Studies showed that drugs used and stressful lives are of significant effect on subjective dry mouth. It is reported that, as anticholinergic activity increases in association with depression the whole saliva flow rate decreases, (17) and individual's psychological state affects the salivary flow rate and be the cause of subjective dry mouth in

depression (18,19). The purpose of this study is to comparatively evaluate the effects of anxiety, depression and stress on unstimulated salivary flow rate and subjective oral dryness.

MATERIALS AND METHODS

Patients who were admitted to Marmara University, Faculty of Dentistry, Department of Oral Diagnosis and Radiology for various reasons were informed about the study. Patients who wanted to participate were included in the study. A detailed systemic anamnesis and the medication history of all participants were recorded.

In our study, in order to determine the factors that may affect salivary flow rate and subjective dry mouth, four groups were formed including a control group consisting of patients who have been determined as healthy except dental problems.

Participants were evaluated under four groups:

First group; 26 individuals with unstimulated salivary flow <0.1 mL/min and subjective oral dryness,

Second group; 24 individuals with unstimulated salivary flow <0.1 mL/min and no subjective oral dryness,

Third group; 25 individuals with unstimulated salivary flow >0.1 mL/min and subjective oral dryness,

Fourth group (control group); 25 individuals with unstimulated salivary flow rate ≥0.1 mL/min. and no subjective oral dryness.

Three groups were compared independently with the control group.

The individuals were asked to refrain from eating, drinking, toothbrushing, and the use of tobacco for at least 1 hr prior to the appointment, which was between 9 and 11 a.m. The participant was first requested to swallow to clear the mouth of saliva and then saliva was allowed to drool for 10 min into a centrifuge glass tube graded in 0.1-mL increments up to 10 mL (20).

The question "Does your mouth usually feel dry?" was used as an indicator of subjective oral dryness (21). Initially, five questions based on the work of Fox et al. were used as indicators of subjective oral dryness, but the question above showed the strongest combination of sensitivity and specificity (42% and 82%) for the prediction of low salivary flow, and was thus used for further evaluation (5).

Assessment of Depression, State-Trait Anxiety and General Perceived Stress

We used the Turkish version of 21-item Beck Depression Inventory to assess the intensity of depression. The Beck Depression Inventory focuses on affective, cognitive, somatic, and behavioral aspects of depression (22).

The State-Trait Anxiety Inventory was developed to assess both state and trait anxiety. State anxiety is characterized by subjective feelings such as tension, apprehension, and nervousness, and is regarded as having a transitory nature. Trait anxiety refers to relatively stable individual differences in anxiety-proneness. Both the State anxiety scale and the Trait anxiety scale consist of 20 items, which are scored on four-point intensity scales.

The General Perceived Stress Questionnaire emphasizes cognitive perceptions more than emotional states or specific life events. It was developed to measure general stress perceived over the preceding year or two, and is a 30-item questionnaire.

In this study, statistical analysis was done with GraphPad Prisma V.3 package program. For evaluating data, one-way analysis of variance was used for descriptive statistical methods (mean, standard deviation) as well as comparisons between groups, Tukey multiple comparison test was used for sub-group comparisons. Bonferroni adjustment was carried out. $p<0.008$ was set for posthoc analysis. Chi-square test was used for comparisons of qualitative data. The standard level of significance was $p<0.05$ level.

RESULTS

Internal consistency reliability of the tests used are: Beck Depression Inventory 0.92, State Anxiety Inventory 0.96, Trait Anxiety Inventory 0.95 and General Perceived Stress Questionnaire 0.91. Internal consistency reliability values of all tests were over 0.70 (Table 1).

Table 1: Internal consistency reliability of the tests used

	α -Cronbach
Beck Depression Inventory	0,92
State Anxiety Inventory	0,96
Trait Anxiety Inventory	0,95
General Perceived Stres Questionnaire	0,91

Of the participants 88,5% had systemic diseases (Table 2) and 84.6% used drugs (Table 3) in Group 1. The group with the least number of participants with systemic dieseases and under medication was the control group.

Statistical differences were observed in the distribution of depression scales among groups (F:10,27 p=0,0001) (Table 4). Depression score of Group 1 was significantly higher than that of Group 4 (p=0.0001). Depression score of Group 2 was significantly higher than that of Group 3 (p=0,001) (Table 5).

Statistical differences were observed in the distribution of state anxiety and trait anxiety scales among groups (F:3,79, F:3,90, p=0,013, p=0,011) (Table 4). Although not statistically significant, state anxiety and trait anxiety scores of Group 1 and Group 2 was found to be higher than those of Group 4 (p=0,04, p=0,026) (p=0,028, p=0,015) (Table 5).

Statistical differences were observed in the distribution of general perceived stress questionnaire scores among groups (F:3,88 p=0,0132) (Table 4). Although not statistically significant, general perceived stress questionnaire scores of Group 1 and Group 2 was found to be higher than that of Group 4 (p=0,013) (p=0,04) (Table 5).

Table 2: Systemic disease distribution of the groups

		Gorup 1		Group 2		Group 3		Group 4	
Systemic Disease	No	3	11,5%	12	50,0%	15	60,0%	21	84%
	Yes	23	88,5%	12	50,0%	10	40,0%	4	16%

Table 3: Medications used by the patients

		Gorup 1		Group 2		Group 3		Group 4	
Medication	No	4	15,4%	13	54,2%	13	52,0%	22	88%
	Yes	22	84,6%	11	45,8%	12	48,0%	3	12%
Antidiabetic	No	20	76,9%	24	100,0%	25	100,0%	24	96%
	Yes	6	23,1%		0,0%		0,0%	1	4%
Antidepressant	No	18	69,2%	20	83,3%	22	88,0%	25	100%
	Yes	8	30,8%	4	16,7%	3	12,0%		0%
Antihypertensive	No	16	61,5%	21	87,5%	18	72,0%	25	100%
	Yes	10	38,5%	3	12,5%	7	28,0%		0%

Table 4: Distribution of depression, anxiety and stres of the groups

	Group 1	Group 2	Group 3	Group 4	F	p
Beck Depression Inventory	25,23±7,97	22,54±5,59	20,28±10,79	13,6±5,55	10,27	0,0001
State Anxiety Inventory	51,5±11,37	52,04±9,03	46,6±10,95	43,76±9,2	3,79	0,013
Trait Anxiety Inventory	50,69±8,4	51,25±6,92	49,08±7,43	44,36±8,69	3,90	0,011
General Perceived Stress Questionnaire	43,08±10,9	42±9,55	38,52±10,63	33,56±12,34	3,88	0,012

Table 5: Distribution of depression, anxiety and stres between groups

Tukey Multiple Comparison Test	Beck Depression Inventory	State Anxiety Inventory	Trait Anxiety Inventory	General Perceived Stress Questionnaire
Group 1/Group 2	0,62	1,00	0,98	0,99
Group 1/Group 3	0,11	0,32	0,89	0,45
Group 1/Group 4	0,0001	0,04	0,026	0,013
Group 2/Group 3	0,74	0,25	0,77	0,68
Group 2/Group 4	0,001	0,028	0,015	0,04
Group 3/Group 4	0,016	0,76	0,16	0,38

DISCUSSION

Many researchers state that xerostomia and hyposalivation should be collected under two separate headings. They agree that xerostomia is a symptom expressing the subjective feeling of dry mouth and hyposalivation is the sign showing the decreased salivary flow rate (23,24). But a consensus related to xerostomia still is not present. According to Malmö-Copenhagen Sjogren's syndrome research group in 1990, xerostomia has been confirmed as salivary gland disease rather than symptoms of dry mouth (25). The lack of consensus on this issue of authoritarianism is creating challenges for young researchers who want to work on xerostomia and hyposalivation. In a comprehensive study, Nederfors (224) separated salivary gland hypofunction under three sub-groups as xerostomia, hyposalivation and altered saliva and stated that xerostomia may be seen without hyposalivation; hyposalivation may be symptom-free and altered composition of saliva may be seen without subjective dry mouth and affecting salivary flow rate. Also, it is claimed that these three sub-groups are inter-related with each other and they could influence each other to different extend (26). Based on these studies; we formed the groups according to the presence of subjective oral dryness and/or hyposalivation and also formed a control group with no subjective oral dryness and hyposalivation.

Many studies examining the etiological factors of hyposalivation and subjective oral dryness have ignored the role of psychological factors, while focusing on the effects of medications. . However, depressive disorders are reported to be of the most common diseases and decreased salivary flow rate and subjective symptoms of dry mouth were declared to be present in many patients with depression (27,28,29).

Salivary cortisol level is increased as a response of the adrenal cortex to stressors such as chronic dental anxiety, stressful activities in front of computer, viewing anxiety-inducing videos and masticator muscle activity caused by clenching teeth (30). As noted earlier, the feeling of dry mouth may have a psychological cause. Psychological processes are often accompanied by disturbed oral sensations and in fact, most individuals have experienced a sensation of dry mouth during a period of acute stress. Along with depression, mental stress is sometimes associated with a dry mouth condition, either as a result of the disease itself or as an adverse effect of drugs used in management of the psychological state (31,32).

These issues were highlighted in the Burning Mouth Syndrome (BMS), a psychosomatic disease, considered to be a complex form of symptoms usually defined as burning or less frequently as pain in the oral mucosa or the perioral region by patients. BMS mainly affects the tongue. To a lesser extent it can also affect other parts of the oral mucosa (33,34). BMS has been suggested to be an indicator of depression and there is an etiological relationship between this syndrome with psychological factors - especially depression and anxiety (35). In patients with BMS, another complaint is the dry mouth. These complaints are usually defined as stick of tongue to the palate, feeling of the tongue like board or felt or feeling the mouth rough. However, despite all these complaints, patients often do not suffer eating and swallowing difficulties. This situation suggests that real dryness would differ from subjective dryness according to objective evaluation (35,36).

In our study, there may be possible depressive disorders for the participants who had higher scores on depression inventory. Depression scales only implicate any kind of depression, but we did not use it as a clinical diagnostic tool. There were patients with subjective complaints of dry mouth although salivary flow rate was actually higher than 0.1 ml/min. In a study evaluated on similar patients, it was reported that these patients may specify different symptoms by indicating different statements individually to indicate their symptoms (37). Also like the third group of patients in our study (unstimulated salivary flow rate ≤0.1 mL/min, although patients do not feel subjective oral dryness), it is reported that although some of the patients do not have hyposalivation, subjective dry mouth complaints can be explained as disclaiming these complaints as well as psychiatric symptoms such as anxiety or stress. This situation may be partly due to the effect of age or partly different effects of medication. But, patients have a tendency to explain symptoms differently individually (5).

Bolwig and Rafaelsson (31) examined the relationship between saliva secretion, subjective dry mouth and

psychiatric disorders and stated that salivary flow rate may increase and xerostomia symptoms can reduce after the treatment of depression. They have reported salivary flow rates closer to normal values and a decrease in sensation of xerostomia as a result of electroconvulsive therapy without drug treatment.

Bergdahl J. and Bergdahl M. (5) stated that medication and age play important roles among the factors that could cause decreased unstimulated salivary flow rate (<0.1 ml / min) and gender, anxiety, depression and stress may play an important role that cause oral subjective dryness in their study conducted on1202 individuals.

In this study, the number of participants is limited with 100 individuals under four groups. Future studies with higher number of participants in all groups which are formed according to hyposalivation and subjective oral dryness are necessary.

CONCLUSION

According to the results of this study, depression, anxiety and stress were found to play important roles in decreasing salivary flow rate and increasing subjective oral dryness. Medication and psychological factors may show reciprocal influence on the formation of subjective dry mouth and salivary flow rate decrease.

Acknowledgments

This study derives from the doctorate thesis of M. Oğuz Borahan which is entitled "Evaluation of the Effects of Medication, Anxiety, Depression, and Stress on Salivary Flow and Subjective Oral Dryness"; presented as a poster in the IADR/AADR/CADR 89th General Session and Exhibition (March 16-19, 2011), San Diego, USA and supported by the Marmara University Scientific Research Project Council (project no: SAG- D-070211-0006).

REFERENCES

1. Bergdahl M, Bergdahl J, Johansson I. Depressive symptoms in individuals with idiopathic subjective dry mouth. J Oral Pathol Med. 1997;26(10):448-450.
2. Rudney JD. Saliva and dental plaque. Adv Dent Res. 2000;14:29-39.
3. Tylenda CA, Ship JA, Fox PC, Baum BJ. Evaluation of submandibular salivary flow rate in different age groups. J Dent Res. 1988;67(9): 1225-1228.
4. Sreebny LM, Schwartz SS. A reference guide to drugs and dry mouth, 2nd edition. Gerodontology.1997;14:33-47.
5. Bergdahl M, Bergdahl J. Low unstimulated salivary flow and subjective oral dryness: association with medication, anxiety, depression, and stress. J Dent Res. 2000;79(9):1652-1658.
6. Sreebny LM, Valdini A.Xerostomia. Part I: Relationship to other oral symptoms and salivary gland hypofunction. Oral Surg Oral Med Oral Pathol. 1988;66(4):451-458.
7. Locker D, Subjective reports of oral dryness in an older adult population. Community Dent Oral Epidemiol. 1993;21(3):165-168.
8. Kal Bi, Tuğsel Z, Özgönül AM. The Diagnostic Importance of Saliva for Systemic Diseases: Review Turkiye Klinikleri J Med Sci 2008;28(1): 66-73.
9. Fox PC. Saliva and salivary gland alterations in HIV infections JADA. 1991;122:46-48.
10. Kho HS, Lee SW, Chung SC, Kim YK. Oral manifestations and salivary flow rate, pH, and buffer capacity in patients with end-stage renal disease undergoing hemodialysis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1999; 88(3): 316-319.
11. Bergdahl J, Bergdahl M. Environmental illness: evaluation of salivary flow, symptoms, diseases, medications, and psychological factors. Acta Odontol Scand. 2001;59(2):104-110.
12. Cooper JS, Fu K,Marks J, Silverman S.Late effects of radiation therapy in the head and neck region. Int J Radiat Oncol Biol Phys. 1995;31(5): 1141-1164.
13. Cassano P, Fava M. Depression and public health, an overview. J Psychosomatic Res. 2002; 53: 849–857.
14. Koolhaas JM, Bartolomucci A, Buwalda B, de Boer SF, Flügge G et.al, Stress revisited: a critical evaluation of the stress concept. Neurosci Biobehav Rev. 2011;35(5):1291-1301.
15. Ohman, A. Fear and anxiety: Evolutionary, cognitive, and clinical perspectives. In M. Lewis & J. M. Haviland-Jones (Eds.). Handbook of emotions. New York: The Guilford Press. 2000, pp.573-593.
16. Barlow DH. Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. Am Psychol. 2000;55(11):1247-1263.
17. Friedlander AH, Norman DC. Late-life depression: psychopathology, medical interventions, and dental implications. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002;94(4):404-412.
18. Navazesh M, Christensen C, Brightman V. Clinical criteria for the diagnosis of salivary gland hypofunction. J Dent Res. 1992;71(7): 1363-1369.
19. Navazesh M, Mulligan R, Barron Y, Redford M, Greenspan D, Alves M, Phelan J. Women's Interagency HIV Study participants. A 4-year longitudinal evaluation of xerostomia and salivary gland hypofunction in the Women's Interagency HIV Study participants. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2003;95(6):693-698.

20. Bergdahl M, Bergdahl J. Perceived taste disturbance in adults: prevalence and association with oral and psychological factors and medication. Clin Oral Investig. 2002;6(3):145-149.

21. Bergdahl M, Salivary flow and oral complaints in adult dental patients. Community Dent Oral Epidemiol. 2000;28(1):59-66.

22. Hisli N. Beck Depresyon Envanteri'nin geçerliği üzerine bir çalışma. Türk Psikoloji Dergisi. 1988;6(22):118-126.

23. Fox PC Management of dry mouth. Dent Clin North Am. 1997;41(4): 863-875.

24. Nederfors T, Isaksson R, et. al.Prevalence of perceived symptoms of dry mouth in an adult Swedish population--relation to age, sex and pharmacotherapy. Community Dent Oral Epidemiol. 1997;25(3):211-216.

25. Manthorpe R, Axell T. Xerostomia. Clin Exp Rheumatol. 1990; 8 Suppl 5: 7-12.

26. Nedefors T. Xerostomia and hyposalivation. Adv Dent Res. 2000;14: 48-56.

27. Friedlander AH, Norman DC. Late-life depression: psychopathology, medical interventions, and dental implications. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002;94(4):404-412.

28. Friedlander AH, Friedlander IK, Marder SR. Posttraumatic stress disorder: psychopathology, medical management, and dental implications. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2004;97(1):5-11.

29. Queiroz CS, Hayacibara MF, Tabchoury CP, Marcondes FK, Cury JA. Relationship between stressful situations, salivary flow rate and oral volatile sulfur-containing compounds. Eur J Oral Sci. 2002;110(5): 337-340.

30. Iorgulescu G. Saliva between normal and pathological. Important factors in determining systemic and oral health. J Med Life. 2009;2(3): 303-307.

31. Bolwig T, Rafaelsen O. Salivation in affective disorders. Psychol Med. 1972;2(3):232-238.

32. Giddon DB, Lisanti VF Cholinesterase-like substance in the parotid saliva of normal and psychiatric patients. Lancet. 1962;1(7232):725-726.

33. Pekiner FN, Gumru B, Ozbayrak S, Efficacy of moclobemide in burning mouth syndrome: a nonrandomized, open-label study. J Orofac Pain, 2008;22(2):146-152.

34. Pekiner Namdar F, Özbayrak S, Çanakçı E. Burning Mouth Syndrome in patients wearing prothesis: evaluation type I and type II.. The Pain Clinic 2005;17(3):269-273.

35. Eryılmaz A. Psikometrik testlerin organik nedenlere bağlı olmayan ağız yanması sendromunda tanı amaçlı kullanılabilirliği ve tedavi yaklaşımları. Doktora Tezi. İstanbul 1997.

36. Pekiner FN, Gümrü B, Demirel GY, Ozbayrak S. Burning mouth syndrome and saliva: detection of salivary trace elements and cytokine. J Oral Pathol Med. 2009;38(3):269-275.

37. Ben-Aryeh H, Miron D, Szargel R, Gutman D. Whole-saliva secretion rates in old and young healthy subjects. J Dent Res. 1984;63(9):1147-1148.