

Original article

Dentists' Knowledge, Clinical Recognition, and Management of Xerostomia: An International Cross-Sectional Questionnaire-Based Study

Karima Alfitory 

Department of Oral Medicine and Pathology, Faculty of Dentistry, Sirte University, Sirte, Libya

Email: Karima.alfitory@su.edu.ly**Abstract**

Xerostomia is the subjective sensation of oral dryness and may occur with or without objectively reduced salivary flow. It is associated with medications, systemic disease, salivary-gland dysfunction, dehydration, and head-and-neck radiotherapy, and may increase the risk of dental caries, candidiasis, mucosal discomfort, and functional difficulties. Dentists have an important role in recognition and initial management. This study was conducted to assess dentists' knowledge of xerostomia, clinical recognition and management practices, diagnostic confidence, and perceived need for additional education, and to explore associations between professional characteristics and knowledge. An international cross-sectional questionnaire framework was applied to 378 dentist responses from nine reported country categories. The questionnaire included professional characteristics, five knowledge items, clinical recognition and management questions, diagnostic confidence, and perceived educational need. Knowledge was scored from 0–5. Categorical variables were assessed with chi-square/Fisher's exact tests; mean scores with t-tests/ANOVA as appropriate; ordinal relationships with Spearman correlation; and exploratory logistic regression assessed predictors of high knowledge ($\geq 3/5$). A total of 378 dentists participated. The mean knowledge score was $3.82 \pm 0.98/5$ (95% CI, 3.72–3.92), and 341 (90.2%) achieved a score of $\geq 3/5$. Recognition was highest for oral complications (82.8%), followed by the definition of xerostomia (79.6%). Overall, 59.8% reported always or often asking about dry-mouth symptoms, while 54.0% reported always or often investigating medication-related causes. Only 40.5% were confident or very confident in diagnosing and managing xerostomia, whereas 89.4% expressed a definite or possible need for additional education. Participants with formal Oral Medicine training had higher mean knowledge scores than those without training (4.15 ± 0.86 vs 3.67 ± 0.99 ; $p < 0.001$). However, in exploratory multivariable analysis, formal Oral Medicine training was not significantly associated with a knowledge score of $\geq 3/5$ (adjusted OR, 2.06; 95% CI, 0.88–4.85; $p = 0.098$). Dentists demonstrated generally favorable knowledge of fundamental xerostomia concepts, but gaps were observed in clinical recognition, medication-focused assessment, and diagnostic confidence. The substantial perceived need for further education supports structured, clinically oriented education in xerostomia recognition and management. The association between formal Oral Medicine training and knowledge should be interpreted cautiously because it was not statistically significant after adjustment.

Keywords: Xerostomia; Dry Mouth; Dentists; Oral Medicine; Salivary Hypofunction; Clinical Practice.

Introduction

Xerostomia is generally defined as the subjective sensation of oral dryness and should be distinguished from salivary gland hypofunction, which refers to objectively reduced salivary secretion. Although they frequently coexist, the relationship is not absolute; therefore, a patient may report dry mouth despite measurable salivary flow, or may have reduced salivary output without a prominent subjective complaint [1–3].

Saliva contributes to lubrication, buffering, antimicrobial defense, remineralization, taste, mastication, swallowing, and speech. Sustained impairment of salivary protection can therefore produce important oral and functional consequences. Population-based evidence indicates that dry-mouth symptoms are common, although reported prevalence varies according to population, age, medications, and definitions [4–6].

The etiology of xerostomia is multifactorial. Medications are among the most consistently reported contributors, particularly with polypharmacy. Other causes include systemic disease, autoimmune disorders such as Sjögren syndrome, dehydration, salivary-gland disease, and head-and-neck radiotherapy [7–9]. Systematic reviews have documented numerous xerogenic medications and emphasize medication review during assessment [7,9].

Clinically, xerostomia and salivary hypofunction may increase susceptibility to dental caries, candidiasis, mucosal discomfort, tooth sensitivity, and difficulties with eating, speaking, swallowing, and denture use [10,11]. These effects arise from loss of saliva's protective, lubricating, buffering, and antimicrobial functions.

Diagnosis requires a focused medical and medication history, examination of the oral mucosa and salivary glands, and, when indicated, objective assessment of salivary flow. Sialometry is an important objective approach, although methods and thresholds vary among studies [12,13].

Management is individualized and may include identification or modification of reversible causes, hydration, salivary stimulation, saliva substitutes, caries prevention, oral-hygiene reinforcement, and referral when systemic or salivary-gland disease is suspected [10,14,15]. Sjögren syndrome is particularly relevant because salivary dysfunction is a major oral manifestation [16].

Dentists are therefore well positioned to identify dry-mouth complaints and initiate preventive management. Nevertheless, evidence regarding dentists' knowledge, confidence, clinical behavior, and educational needs remains limited. Recent questionnaire studies have demonstrated variability in dentists' knowledge and management awareness and have highlighted continuing education as a potential determinant of better preparedness [17–19].

The present study aimed to assess dentists' knowledge, clinical recognition, management approaches, diagnostic confidence, and perceived need for further education regarding xerostomia, while exploring associations with professional status, clinical experience, and previous formal Oral Medicine training.

Materials and Methods

Study design and participants

An international cross-sectional questionnaire-based study was conducted among practicing dentists from different countries. Data were collected over a seven-month period. Dentists were invited to participate through professional and academic networks. Participation was voluntary, and responses were collected anonymously.

Questionnaire

A structured self-administered questionnaire was developed and administered electronically using Google Forms. The questionnaire consisted of three sections: professional characteristics, knowledge of xerostomia, and clinical recognition and management.

The professional section collected information on country of practice, professional status, years of clinical experience, and previous formal Oral Medicine training. The knowledge section included five multiple-choice questions addressing the definition, causes, systemic associations, oral complications, and objective assessment of xerostomia. The clinical section assessed frequency of symptom enquiry, investigation of medication-related causes, initial management, preventive advice, diagnostic confidence, and perceived need for additional education. Each correct knowledge response was assigned one point and each incorrect response zero points, producing a total score ranging from 0 to 5. For analysis, a score of $\geq 3/5$ was categorized as higher knowledge.

Data collection and statistical analysis

Responses were exported from Google Forms to Microsoft Excel for data cleaning and subsequently analyzed using IBM SPSS Statistics version 26. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using means and standard deviations.

Associations between categorical variables were assessed using the chi-square test or Fisher's exact test, as appropriate. Differences in mean knowledge scores were examined using the independent-samples *t*-test or one-way ANOVA, as appropriate. Spearman's correlation was used for ordinal variables. Exploratory binary logistic regression was performed to assess factors associated with higher knowledge. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported. A two-sided $p < 0.05$ was considered statistically significant.

Ethical considerations

Ethical approval was obtained from (Sirte University, 10.SU.2026). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Participation was voluntary and anonymous. No personally identifiable information was collected. Completion and submission of the questionnaire were considered to indicate informed consent to participate.

3. Results

3.1 Participant characteristics

A total of 378 dentists were included in the analysis. Most participants practiced in Libya (133, 35.2%), followed by Egypt (49, 13.0%) and Tunisia (39, 10.3%). General dentists comprised 263 participants (69.6%), while 115 (30.4%) were specialists. Regarding clinical experience, 147 (38.9%) had <5 years of experience, 119 (31.5%) had 5–10 years, and 112 (29.6%) had >10 years. Formal Oral Medicine training was reported by 117 participants (31.0%). Participant characteristics are presented in Table 1.

Table 1. Professional characteristics of the participating dentists (N = 378)

Characteristic	n	%
Professional status		
General dentist	263	69.6
Specialist	115	30.4
Clinical experience		
<5 years	147	38.9
5–10 years	119	31.5
>10 years	112	29.6
Formal Oral Medicine training		
Yes	117	31.0
No	261	69.0

Knowledge of xerostomia

The mean knowledge score was 3.82 ± 0.98 out of 5 (95% CI, 3.72–3.92). Overall, 341 participants (90.2%) achieved a knowledge score of $\geq 3/5$. Correct recognition was highest for oral complications (313, 82.8%) and the definition of xerostomia (301, 79.6%). Recognition of common causes, objective salivary assessment, and the association between xerostomia and Sjögren syndrome was reported by 282 (74.6%), 274 (72.5%), and 273 (72.2%) participants, respectively (Table 2).

Table 2. Item-level knowledge of xerostomia (N = 378)

Knowledge domain	Correct, n	Correct, %
Definition	301	79.6
Common causes	282	74.6
Association with Sjögren syndrome	273	72.2
Oral complications	313	82.8
Objective salivary assessment	274	72.5

Table 3. Distribution of total knowledge scores (N = 378)

Knowledge score	n	%
0	0	0.0
1	7	1.9
2	30	7.9
3	89	23.5
4	151	39.9
5	101	26.7
Total	378	100.0

The most frequent knowledge score was 4/5 (151, 39.9%), followed by 5/5 (101, 26.7%). Overall, 37 participants (9.8%) had scores below 3/5.

Clinical recognition and medication assessment

Regarding clinical recognition, 112 participants (29.6%) reported that they always asked about dry-mouth symptoms, while 114 (30.2%) reported doing so often. Thus, 226 participants (59.8%) reported asking about dry-mouth symptoms always or often. Medication-related causes were always investigated by 86 participants (22.8%) and often investigated by 118 (31.2%), corresponding to 204 participants (54.0%) who reported this practice always or often (Table 4).

Table 4. Clinical recognition and medication-assessment practices (N = 378)

Clinical practice	Always, n (%)	Often, n (%)	Always/Often, n (%)
Ask about dry-mouth symptoms	112 (29.6)	114 (30.2)	226 (59.8)
Investigate medication-related causes	86 (22.8)	118 (31.2)	204 (54.0)

Initial management and preventive practices

The most frequently reported initial management approach was identifying and addressing the underlying cause (171, 45.2%), followed by encouraging hydration (88, 23.3%), recommending saliva substitutes (61, 16.1%), and referring the patient (48, 12.7%). Other approaches were reported by 10 participants (2.6%) (Table 5).

Table 5. Usual initial management approach for xerostomia (N = 378)

Management approach	n	%
Identify/address underlying cause	171	45.2
Encourage hydration	88	23.3
Saliva substitutes	61	16.1
Refer patient	48	12.7
Other	10	2.6
Total	378	100.0

Preventive advice was reported as being provided always by 128 participants (33.9%) and often by 120 (31.7%). Overall, 248 participants (65.6%) reported providing preventive advice always or often.

Diagnostic confidence and educational needs

Confidence in diagnosing and managing xerostomia varied among participants. A total of 153 dentists (40.5%) reported being confident or very confident, whereas 225 (59.5%) reported moderate, slight, or no confidence (Table 6).

Table 6. Confidence in diagnosing and managing xerostomia (N = 378)

Confidence level	n	%
Very confident	34	9.0
Confident	119	31.5
Moderately confident	130	34.4
Slightly confident	67	17.7
Not confident	28	7.4
Total	378	100.0

Regarding the need for additional education, 225 participants (59.5%) answered “yes” and 113 (29.9%) answered “maybe.” Thus, 338 participants (89.4%) expressed a definite or possible need for additional education (Table 7).

Table 7. Perceived need for additional education on xerostomia (N = 378)

Response	n	%
Yes	225	59.5
Maybe	113	29.9
No	40	10.6
Total	378	100.0

Knowledge according to professional characteristics

Mean knowledge scores differed significantly according to formal Oral Medicine training. Participants with formal training had a higher mean knowledge score than those without training (4.15 ± 0.86 vs 3.67 ± 0.99 ; $p < 0.001$). No statistically significant differences in mean knowledge scores were observed according to professional status or clinical experience (Table 8).

Table 8. Mean knowledge score according to professional characteristics

Characteristic	Mean $\pm$ SD	p-value
Professional status		0.509
General dentist	3.78 ± 1.01	
Specialist	3.90 ± 0.90	
Clinical experience		0.572
<5 years	3.75 ± 0.97	
5–10 years	3.87 ± 1.00	
>10 years	3.85 ± 0.97	
Formal Oral Medicine training		<0.001
Yes	4.15 ± 0.86	
No	3.67 ± 0.99	

Exploratory multivariable analysis

In an exploratory logistic regression model, formal Oral Medicine training was associated with higher odds of achieving a knowledge score of $\geq 3/5$ (adjusted OR, 2.06); however, this association was not statistically significant after adjustment (95% CI, 0.88–4.85; $p = 0.098$). Professional status and clinical experience were also not significantly associated with a knowledge score of $\geq 3/5$ (Table 9).

Table 9. Exploratory logistic regression analysis of factors associated with a knowledge score $\geq 3/5$

Predictor	Adjusted OR	95% CI	p-value
Formal Oral Medicine training	2.06	0.88–4.85	0.098
Specialist vs general dentist	1.43	0.65–3.15	0.373
5–10 years vs <5 years	1.44	0.60–3.43	0.410
>10 years vs <5 years	0.90	0.41–1.98	0.785

Discussion

The principal finding of this study was a potential knowledge–practice–confidence gap among participating dentists. Although the mean knowledge score was 3.82/5 and 90.2% achieved a score of $\geq 3/5$, only 59.8% reported always or often asking about dry-mouth symptoms, 54.0% reported always or often investigating medication-related causes, and 40.5% reported being confident or very confident in diagnosing and managing xerostomia. This pattern is clinically relevant because appropriate xerostomia assessment requires integration of symptoms, medication history, systemic conditions, oral findings, and, when indicated, objective assessment of salivary function [12–15].

Recognition of oral complications was the strongest knowledge domain (82.8%). This finding is consistent with established evidence linking salivary dysfunction with dental caries, mucosal infections, oral discomfort, tooth sensitivity, and

functional difficulties [10,20,21]. Recent reviews have also emphasized the broader effects of dry mouth on eating, speech, swallowing, oral health, and quality of life [20,21]. The relatively high recognition of oral complications may reflect their direct clinical relevance to routine dental practice.

Knowledge of the definition of xerostomia was also relatively high (79.6%). This is consistent with the established distinction between xerostomia as a subjective perception of oral dryness and hyposalivation as objectively reduced salivary flow [1–3]. Nevertheless, approximately one-fifth of participants did not correctly identify this distinction. This is clinically important because subjective symptoms and objectively measured salivary flow do not necessarily correspond closely in all patients [12,22].

Recognition of common causes was lower (74.6%), and only 54.0% reported always or often investigating medication-related causes. This finding is relevant because medications are among the major contributors to xerostomia, and medication review is an important component of clinical assessment [7,9,14]. The difference between recognizing common causes and routinely investigating medication-related causes may indicate that factual knowledge does not always translate into consistent clinical history-taking.

Recognition of the association between xerostomia and Sjögren syndrome (72.2%) and knowledge of objective salivary assessment (72.5%) were also incomplete. Sjögren syndrome is an established cause of salivary gland dysfunction, and objective assessment of salivary flow has an important role in its evaluation [16,23]. Evidence demonstrating substantially reduced unstimulated whole-salivary flow among patients with Sjögren syndrome further emphasizes the importance of understanding both the subjective and objective dimensions of salivary dysfunction [23].

The most frequently reported initial management approach was identifying and addressing the underlying cause (45.2%), followed by encouraging hydration (23.3%) and recommending saliva substitutes (16.1%). This pattern is broadly consistent with clinical guidance supporting individualized and multimodal management according to etiology, residual gland function, symptom severity, and patient needs [14,15,22,25]. The variation in reported management approaches should not, therefore, be interpreted as evidence of inappropriate care, because the appropriate intervention may differ substantially between patients.

Preventive advice was reported as being provided always or often by 65.6% of participants. This relatively frequent emphasis on prevention is consistent with recommendations highlighting caries prevention, oral hygiene, fluoride use, and regular dental follow-up among patients with salivary hypofunction [10,14,15]. A German survey of dentists similarly reported the use of preventive measures for patients affected by dry mouth, although differences in encounter frequency and recognition were observed [18].

An important finding was the discrepancy between knowledge and diagnostic confidence. Although 90.2% of participants achieved a knowledge score of $\geq 3/5$, only 40.5% reported being confident or very confident in diagnosing and managing xerostomia. This difference suggests that factual knowledge alone may not translate into clinical confidence. Effective management requires practical competencies that extend beyond knowledge recall, including medication review, differential diagnosis, recognition of systemic disease, interpretation or use of salivary assessment, preventive planning, and appropriate referral [12,14,22].

Formal Oral Medicine training was associated with a significantly higher mean knowledge score. Participants with previous training had a mean score of 4.15 ± 0.86 compared with 3.67 ± 0.99 among those without training ($p < 0.001$). However, this association was attenuated in the exploratory multivariable analysis and was not statistically significant for the binary outcome of a knowledge score $\geq 3/5$ (adjusted OR, 2.06; 95% CI, 0.88–4.85; $p = 0.098$). Accordingly, these findings support an association between formal Oral Medicine training and higher observed knowledge scores, but they do not establish that training is an independent predictor or cause of higher knowledge.

Recent international evidence provides a useful comparison. In a six-country survey of 884 dentists, 34.3% demonstrated good overall knowledge and 53.7% demonstrated moderate knowledge, with continuing education identified among factors associated with better knowledge and awareness [19]. The proportion of participants achieving a score of $\geq 3/5$ in the present study was higher; however, the instruments, scoring systems, populations, and thresholds differed, making direct comparison inappropriate. Nevertheless, both studies highlight the potential relevance of continuing education in improving dentists' knowledge and awareness of dry-mouth conditions.

Other studies have reported partially different patterns. A German survey of dentists found relatively infrequent routine encounters with patients reporting dry mouth, while preventive measures were nevertheless reported among affected patients [18]. The present study similarly identified an emphasis on preventive advice, while reported symptom questioning was relatively more frequent. Such differences may reflect variations in practice settings, patient populations, sampling methods, and questionnaire wording rather than differences in clinical competence.

The finding that 89.4% of participants expressed a definite or possible need for additional education is therefore noteworthy. This substantial perceived educational need is consistent with international evidence suggesting that further education may be beneficial in the recognition and management of dry mouth [19]. Educational interventions should address medication-induced xerostomia, differentiation between xerostomia and hyposalivation, indications for objective salivary assessment, recognition of Sjögren syndrome, prevention of caries and oral infections, use of saliva substitutes or stimulants, and appropriate referral pathways [7,13–16,25,28–29].

Future research

Future studies should use validated or formally piloted instruments to assess dentists' knowledge and clinical practices, with clearly prespecified scoring criteria and evaluation of reliability and construct validity. Larger and more geographically balanced studies are needed to determine whether structured continuing education improves diagnostic confidence, medication assessment, objective salivary assessment, preventive care, and management practices. Prospective and intervention-based studies could further determine whether improvements in knowledge translate into measurable changes in clinical practice. Future research should also consider educational exposure, years since graduation, practice setting, patient volume, and access to Oral Medicine services. Country-specific comparisons should be undertaken only when recruitment methods and sample sizes permit meaningful interpretation.

Strengths and Limitations

Several limitations should be considered when interpreting these findings. First, the cross-sectional design prevents determination of causal relationships between professional characteristics, educational exposure, knowledge, and clinical practices. Second, participants were recruited through professional and academic networks, which may have introduced selection bias and may limit the generalizability of the findings to the broader population of dentists. Third, the distribution of participants across countries was uneven; therefore, the findings should not be interpreted as nationally representative estimates. Fourth, clinical practices and confidence were self-reported and may have been affected by recall and social-desirability bias. Finally, the five-item knowledge scale provides a relatively limited assessment of the broader knowledge required for clinical management of xerostomia. The $\geq 3/5$ classification should therefore be interpreted as a pragmatic study threshold rather than a validated measure of clinical competence.

Conclusion

Dentists in this international sample demonstrated generally favorable knowledge of fundamental xerostomia concepts, particularly recognition of oral complications and the definition of xerostomia. However, clinical recognition and medication-focused assessment were not consistently reported, and fewer than half of participants described themselves as confident or very confident in diagnosing and managing xerostomia. Formal Oral Medicine training was associated with higher mean knowledge scores in the unadjusted analysis, but the exploratory adjusted analysis did not demonstrate a statistically significant association with a knowledge score of $\geq 3/5$. The substantial proportion of participants expressing a definite or possible need for additional education supports the value of structured, clinically oriented education in xerostomia recognition and management. These findings should be interpreted in light of the cross-sectional design, sampling approach, self-reported measures, limited knowledge scale, and uneven country representation. Further prospective and intervention-based research is warranted to determine whether educational interventions translate into improved clinical practice.

References

1. Alsalthani AB, Nassani MZ, Noushad M, Tarakji B, Rastam S, Sioufi A, et al. Evaluating dentists' understanding of dry mouth management: an international cross-sectional study. *Oral Dis*. 2025;31(4):1206-1214. doi:10.1111/odi.15176.
2. Fisić A, Cevik Aras H, Almhöjd U, Almståhl A. Dental care professionals' awareness of oral dryness and its clinical management: a questionnaire-based study. *BMC Oral Health*. 2024;24:45. doi:10.1186/s12903-023-03813-2.
3. Mayer E, Klapper HU, Nitschke I, Hahnel S. Observations, knowledge, and attitude towards treatment options in patients with dry mouth: a survey among German dentists. *Clin Oral Investig*. 2019;23(12):4189-4194. doi:10.1007/s00784-019-02858-4.
4. Abdelghany A, Nolan A, Freeman R. Treating patients with dry mouth: general dental practitioners' knowledge, attitudes and clinical management. *Br Dent J*. 2011;211(10):E21. doi:10.1038/sj.bdj.2011.966.
5. Altamimi MA. Update knowledge of dry mouth—a guideline for dentists. *Afr Health Sci*. 2014;14(3):736-742. doi:10.4314/ahs.v14i3.33.
6. Villa A, Connell CL, Abati S. Diagnosis and management of xerostomia and hyposalivation. *Ther Clin Risk Manag*. 2015;11:45-51. doi:10.2147/TCRM.S76282.
7. Wolff A, Joshi RK, Ekström J, Aframian D, Pedersen AML, Proctor G, et al. A guide to medications inducing salivary gland dysfunction, xerostomia, and subjective sialorrhea: a systematic review sponsored by the World Workshop on Oral Medicine VI. *Drugs R D*. 2017;17(1):1-28. doi:10.1007/s40268-016-0153-9.
8. Thomson WM, Chalmers JM, Spencer AJ, Williams SM. The Xerostomia Inventory: a multi-item approach to measuring dry mouth. *Community Dent Health*. 1999;16(1):12-17.
9. Thomson WM, Williams SM. Further testing of the Xerostomia Inventory. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2000;89(1):46-50. doi:10.1016/S1079-2104(00)80013-X.
10. Agostini BA, Cericato GO, Silveira ER, Nascimento GG, Costa FS, Thomson WM, Demarco FF. How common is dry mouth? Systematic review and meta-regression analysis of prevalence estimates. *Braz Dent J*. 2018;29(6):606-618. doi:10.1590/0103-6440201802302.
11. 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.
12. Hopcraft MS, Tan C. Xerostomia: an update for clinicians. *Aust Dent J*. 2010;55 Suppl 1:238-244.
13. Turner MD, Ship JA. Dry mouth and its effects on the oral health of elderly people. *J Am Dent Assoc*. 2007;138 Suppl:15S-20S.

14. Mignogna MD, Fedele S, Lo Russo L, Lo Muzio A, Wolff A. Sjögren's syndrome: the diagnostic potential of early oral manifestations preceding hyposalivation/xerostomia. *J Oral Pathol Med.* 2005;34(1):1-6. doi:10.1111/j.1600-0714.2004.00264.x.
15. Pedersen AML, Sørensen CE, Proctor GB, Carpenter GH. Salivary functions in mastication, taste, textural perception, swallowing and initial digestion. *Oral Dis.* 2018;24(8):1399-1416. doi:10.1111/odi.12867.
16. Folke S, Fridlund B, Paulsson G. Views of xerostomia among health care professionals: a qualitative study. *J Clin Nurs.* 2009;18(6):791-798. doi:10.1111/j.1365-2702.2008.02455.x.
17. Appleby NJ, Temple-Smith MJ, Stacey MA, Bailey DL, Deveny EM, Pirotta M. General practitioners' knowledge and management of dry mouth—a qualitative study. *Aust Fam Physician.* 2016;45(7):487-491.
18. Sreebny LM, Valdin A. Xerostomia: a neglected symptom. *Arch Intern Med.* 1987;147(7):1333-1337.
19. Meurman JH, Grönroos L. Oral and dental health care of oral cancer patients: hyposalivation, caries and infections. *Oral Oncol.* 2010;46(6):464-467.
20. Aliko A, Wolff A, Dawes C, Aframian D, Proctor G, Ekström J, et al. World Workshop on Oral Medicine VI: clinical implications of medication-induced salivary gland dysfunction. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2015;120(2):185-206. doi:10.1016/j.oooo.2014.10.027.
21. Mukaibo T, Kondo Y, Munemasa T, Nodai T, Takahashi M, Muranaka T, et al. Dental prosthetic treatment outcomes in patients with xerostomia and hyposalivation: a scoping review. *J Prosthodont Res.* 2026. doi:10.2186/jpr.JPR_D_26_00006.
22. Takahashi M, Mukaibo T, Kubota J, Tada Y, Karaki J, Nodai T, et al. Xerostomia and oral health quality of life: patterns across different occlusal status in older adults. *J Prosthodont Res.* 2026;70(1):65-72.
23. Boonyoung K, Buajeeb W, Panpradit N, Na-Ek N, Pimolbutr K. Prevalence of xerostomia and hyposalivation in older adults: a systematic review and meta-analysis. *BMC Oral Health.* 2026;26:1125.
24. López-Pintor RM, González-Serrano J, Villa A, Musella G, Santos-Silva AR, Rodríguez-Molinero J. Diagnosis and management of immune checkpoint inhibitor-induced dry mouth and salivary gland dysfunction in oncology patients: a systematic review. *Support Care Cancer.* 2026;34(7):723.
25. Zainuddin FZA, Guan G, Ting GS, Thomson WM. Measuring dry mouth in older people in residential care. *Gerodontology.* 2026;43(1):103-109.
26. Kumar SS, Arany-Lao-Kan G, Xu X, Mahmoud AH, Massarotto FC, Thomas V, et al. Minor salivary flow as a diagnostic tool for screening hyposalivation in medication-induced xerostomia. *BMC Oral Health.* 2026;26(1):454.
27. Ito K, Nohno K, Funayama S, Katsura K, Kaneko N, Tanaka K, et al. Impact of temperature, humidity, dehydration, and psychological stress on salivary flow and xerostomia in young men: an observational study. *PLoS One.* 2026;21(5):e0349221.
28. Giacaman RA, Castillo-Hormazábal A, Gambetta-Tessini K, Mahn-Arteaga G, Dodds MW, Preshaw PM, et al. Assessment of a new tool to monitor oral hydration and dry mouth: FishburneTabs. *Oral Dis.* 2026;32(4):1031-1039.
29. Ahmed KA, Ali BHH, Oun NM, Alsharief MS. Prevalence of stress-induced xerostomia among Libyan students: a cross-sectional study on exam-related stress and its impact on oral health. *Jordan J Dent.* 2025;2(1).