

## UNDERSTANDING THE CONNECTIONS BETWEEN EATING DISORDERS AND ORAL HEALTH: A SYSTEMATIC REVIEW

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### Abstract

**Objectives:** To systematically evaluate the available literature regarding the association of eating disorders (EDs) with oral health.

**Methods:** A search across four databases identified 325 publications. After duplicate removal using Rayyan QCRI and relevance screening, 141 full-text articles were reviewed, leading to the inclusion of 5 studies. Results: We included five studies with a total of 225 diagnosed with EDs and all of them were females. The findings show a clear link between EDs and oral health issues, such as tooth erosion, caries, periodontal disease, and soft tissue damage. Patients with EDs had higher rates of tooth sensitivity, dry mouth, and oral candidiasis. Regular dental visits and educational efforts improved awareness of erosion risks tied to anorexia and bulimia. Although overall erosion rates were similar to controls, ED patients had lower saliva flow and more severe localized erosion. Soft tissue problems like lip redness, cheilitis, and lesions highlight the importance of dental professionals in identifying and managing EDs early.

**Conclusion:** This review highlights the connection between EDs and oral health problems, stressing the importance of dental professionals in early detection and care. Common issues include tooth erosion, cavities, and soft tissue damage. Although research is limited, evidence suggests dental exams can help identify EDs and enhance patient outcomes. Future studies should focus on larger, standardized approaches to deepen understanding of this link.

**Keywords:** Eating disorders. Anorexia nervosa. Anorexia bulimia. Oral health. Dental care. Systematic review

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### Introduction

Unusual eating patterns and upsetting thoughts are hallmarks of EDs, a collection of intricate and possibly fatal behavioral illnesses [1]. Of the eight EDs mentioned in the Diagnostic and Statistical Manual of Mental Disorders 5th Edition's "Feeding and Eating Disorders" chapter, binge eating disorder, anorexia nervosa (AN), and bulimia nervosa (BN) are the ones that are most commonly discussed in the literature [2, 3]. With an estimated lifetime prevalence of 4.60% in males and 8.50% in females, EDs can affect people of various racial backgrounds, ages, and genders [4]. 3.3 million healthy life years are lost each year as a result of the current global increase in EDs, which presents a significant public health burden [5, 6].

The mouth cavity may also experience the bodily effects of EDs. The direct ingestion of acidic foods, such as oranges, energy beverages, or vinegar for reducing appetite, as well as the regurgitation of stomach contents from self-induced vomiting, can cause tooth erosion in people with EDs [7]. Furthermore, self-induced vomiting, hunger, or psychiatric drugs with ant sialagogue properties frequently impair salivary flow in ED patients [8]. Dental caries and periodontal disease, the two most prevalent oral disorders, may become more likely as a result. Nutritional inadequacies, food preferences, or modifications to oral hygiene practices have all been linked to oral mucosal lesions in ED patients [9]. In addition, there have been reports of increased orofacial pain, temporomandibular disorder (TMD), and bruxism habits [10], which may be related to emotional stress, compulsive exercise, or poor general health. Parotid swelling, which frequently results from self-induced vomiting, has been documented in the literature as a presenting feature of BN [11].

EDs are complex psychiatric conditions that seriously affect the general health, often showing the first signs and symptoms in the oral cavity. The symptoms of EDs include vomiting, nutritional deficiencies, and changes in eating behaviors, which can lead to various dental and oral complications such as erosion, caries, and soft tissue lesions. Although it is well known that EDs have serious systemic health consequences, the oral manifestations of the disease are poorly recognized clinically. The relationship between EDs and oral health provides the healthcare professional, especially dentists and orthodontists, with a very important role in early detection and intervention. This systematic review aims to highlight the role of oral health as an indicator of EDs and to indicate the need for an integrated medical-dental approach in the management of the same.

This review was done to systematically evaluate the available literature

regarding the association of EDs with oral health in view of describing common oral manifestations, the burden of dental complications, and a possible role of dental professionals in early detection and management of the condition.

### Methods

#### Search strategy

The systematic review was done based on the PRISMA and GATHER criteria. An exhaustive search was made to identify studies related to investigate available evidence on the association of EDs with oral health. The reviewers searched four electronic databases: SCOPUS, Web of Science, Cochrane, and PubMed. After removing any duplicates, we uploaded to Rayyan every abstract and title we could locate using electronic searches. Studies published in the last 10 years (2014-2024) were included. The full texts of the study texts that fulfilled the inclusion criteria according to their abstract or title were retrieved for a detailed analysis. Two independent reviewers assessed the appropriateness of the extracted publications and reviewed inconsistencies.

#### Study population-selection

The PEO (Population, Exposure, and Outcome) factors were implemented as inclusion criteria for our review: (i) Population: Individuals diagnosed with or suspected of having EDs (e.g., AN, BN, binge eating disorder), (ii) Exposure: Presence of ED-related behaviors, including vomiting, nutritional deficiencies, excessive dieting, or use of medications that impact oral health, (iii) Outcomes: Oral health issues.

#### Data extraction

Data from studies that satisfied the inclusion requirements were extracted by two objective reviewers using a predetermined and uniform methodology. The following information was retrieved and recorded: (i) First author (ii) Year of publication, (iii) Study design, (iv) Participants' number, (v) Age, (vi) Gender, (vii) Diagnostic tool of EDs, (viii) Oral health issues, (ix) Main outcomes.

#### Quality review

We utilized the ROBINS-I technique to evaluate the risk of bias because it allows for extensive assessment of confounding, which is significant because bias owing to omitted variables is common in studies in this field. The ROBINS-I tool is intended to evaluate non-randomized investigations and can be applied to cohort designs in which participants exposed to various staffing levels are

monitored over time. Two reviewers separately assessed the risk of bias for each paper, and disagreements were resolved through group discussion [12].

**Results**

The specified search strategy yielded 325 publications (Figure 1). After removing duplicates (n = 141), 184 trials were evaluated based on title and abstract. Of these, 134 failed to satisfy eligibility criteria, leaving just 46 full-text articles for comprehensive review. A total of 5 satisfied the requirements for eligibility with evidence synthesis for analysis.

**Sociodemographic and clinical outcomes**

We included five studies with a total of 225 diagnosed with EDs and all of them were females. Regarding the study designs, two were cross-sectional studies [15, 16], two were case-controls [17, 18], and one was a retrospective cohort [14]. Two studies were conducted in the USA [14, 16], one in India [15], one in Portugal [17], and one in Argentina [18].

Other oral health complications among patients with EDs, as were the cases selected for study, included but were not limited to tooth erosion, dental caries, periodontal disease, and soft tissue lesions [14]. The majority of patients with EDs exhibited serious oral signs and symptoms, including but not limited to tooth hypersensitivity, xerostomia, and oral candidiasis. These were significantly higher when compared to the control subjects [15].

It appears that educational interventions and frequent dental visits increased their awareness of possible risks of anorexia nervosa and bulimia nervosa for teeth erosion. Patients who regularly visited dental services were more aware of the implications of oral health for their general health and appearance [16].

In all cases, the mean erosion rate was not statistically different from the control values, even though there was substantial erosion in some subjects; however, the saliva flow rates were always lower among ED patients. Lip erythema, cheilitis, and hemorrhagic lesions were the other soft tissue manifestations. These findings emphasize the important role of dental professionals in diagnosing oral symptoms related to ED and help in its early diagnosis and management [17, 18] (Table 1, Table 2).

**Discussion**

Discussion: Results from this study also established that EDs had strong significant relations with many complications affecting oral health, emphasizing greater considerations for dental manifestations within cases that raise suspicion for ED and, obviously, when they have been diagnosed. Increased dental erosions, caries, and periodontal involvement seen in patients with EDs represent chronic vomiting associated with the conditions, dietary deficits, and inadequate hygiene habits. Rosten & Newton demonstrated that common oral symptoms in bulimic individuals include dental caries, decreased salivary flow rate, parotid hypertrophy, and tooth erosion. Although the majority of the literature focuses on the impacts of vomiting, this study has demonstrated that antidepressant medication, binge eating, and other dietary practices can also affect a bulimic's oral health [19]. Garbin et al. also reported that patients with bulimia nervosa and anorexia typically have gum and tooth lesions. Therefore, the dental surgeon can lessen the burden of these problems on public health and plays a significant role in their early detection [20].

This review also found that the diagnosis of soft tissue lesions, lip erythema, and oral candidiasis further emphasizes the systemic nature of EDs and their effects on oral tissues. Regular dental checkups and selective education seem to increase awareness and maybe decrease some of the oral health risks in ED patients. However, differences in the severity of erosion and flow rates of saliva indicate the need for an individual approach in assessment and treatment. A similar review also stated the significance of including bulimia signs and symptoms in the dental curriculum since dental professionals are frequently the first to recognize bulimia symptoms. Dentists are well-positioned to counsel bulimic patients on maintaining good dental hygiene after vomiting and to minimize their use of acidic foods and beverages [19].

Frequent tooth brushing [21] may aggravate the greater prevalence of dental erosion in ED patients, which may be caused by excessive consumption of acidic beverages or stomach acid [22]. Given its function in flushing, neutralizing acid, and demineralizing the dental enamel with its supersaturated amount of calcium and phosphate ions, decreased salivary flow may also lessen the degree of protection that teeth receive from erosion [23].

The increased frequency of oral lesions may be explained by nutritional deficits

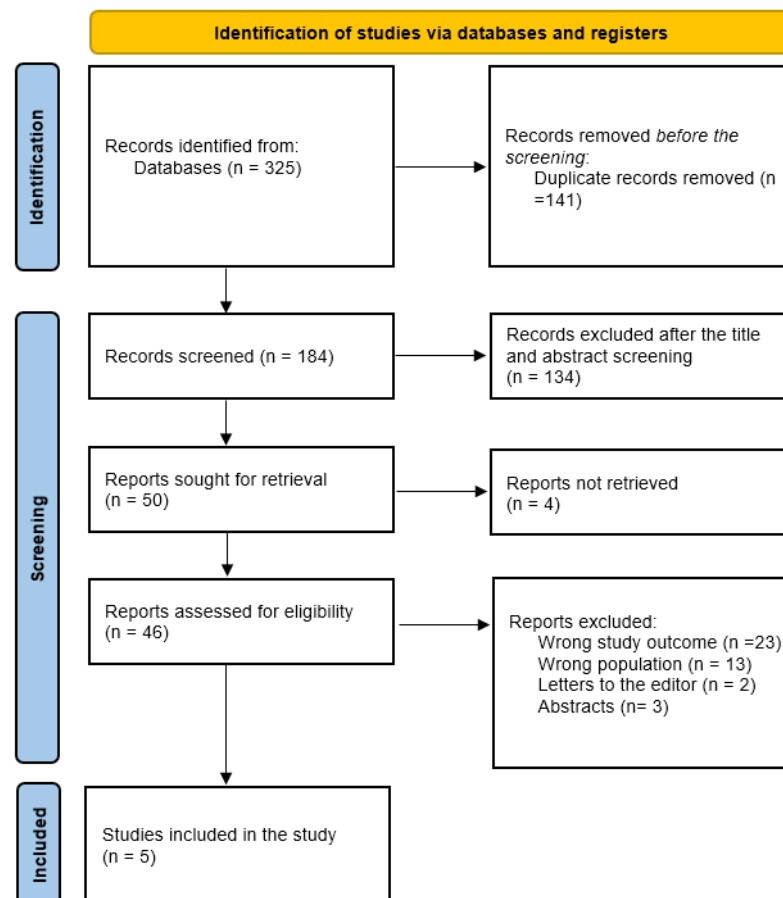


Figure 1. PRISMA flowchart [13].

**Table 1.** Outcome measures of the included studies.

Study ID	Country	Study design	Sociodemographic		Complications	Key findings
Silverstein et al., 2019 [14]	USA	Retrospective cohort	Participants: 41 Mean age: 25.2 Females	DSM V	Tooth erosion (76%) Dry mouth (71.1%) Tooth sensitivity (92.7%) Oral candidiasis (34.7%)	Most patients were aware that AN and BN behaviors could lead to tooth erosion, but only a small portion knew the exact area where it typically occurs. After educational interventions, a much larger group correctly identified the location. Patients who visited the dentist regularly were more likely to believe their oral health positively influenced their appearance, overall health, and happiness.
Jugale et al., 2014 [15]	India	Cross-sectional	Participants: 50 Mean age: 21.9 Females	SCOFF Questionnaire	Tooth erosion (78%) Tooth sensitivity (56%)	The examination revealed a higher prevalence of perimyololysis, dental caries, and tooth sensitivity in suspected cases. The study effectively identified ED, showing significant oral manifestations in those suspected.
Dehghan et al., 2023 [16]	USA	Cross-sectional	Participants: 14 Mean age: 33 Females	DSM V	NS	Compared to the controls, the ED group's stimulated saliva flow rate was noticeably lower, and their DMFT score was greater. The average tooth erosion score of the ED group was not substantially different from the controls, despite the fact that some ED individuals in this pilot research had major tooth erosion.
Lourenço et al., 2018 [17]	Portugal	Case-control	Participants: 55 Age range: 28-50 Females	DSM V	Dental caries, erosion, periodontal disease and lesions in the oral mucosa	Dental caries, erosion, periodontal disease and lesions in the oral mucosa
Panico et al., 2018 [18]	Argentina	Case-control	Participants: 65 Age range: 21.6 Females	DSM V	Soft-tissue lesions and dental erosion	Patients with EDs exhibited lip redness, inflammation of the lips, a yellow-orange hue on the palate, and bleeding lesions.

**Table 2.** Risk of bias assessment using ROBINS-I.

Study ID	Bias due to confounding	Bias in the selection of participants into	Bias in the classification of interventions	Bias due to deviations from the intended interval	Bias due to missing data	Bias in the measurement of outcomes	Bias in the selection of reported result	Overall bias
Silverstein et al., 2019 [14]	Low	Low	Mod	Low	Low	Low	Mod	Low
Jugale et al., 2014 [15]	Mod	Low	Mod	Low	Low	Mod	Low	Moderate
Dehghan et al., 2023 [16]	Mod	Mod	Low	Low	Low	Mod	Low	Moderate
Lourenço et al., 2018 [17]	Mod	Low	Mod	Low	Low	Mod	Low	Moderate
Panico et al., 2018 [18]	Mod	Mod	Low	Low	Low	Mod	Low	Moderate

brought on by selective feeding patterns as well as physical and chemical stress from self-induced purging. People with orange-yellow palates who participated in Panico's study said they took supplements of carotene. The greater frequency of repetitive tongue, lip, or cheek biting and hemorrhagic lesions observed in this group may be caused by self-harming behaviors and emotional disturbances linked to EDs [18].

Dentists may be in a good position to provide early identification and intervention for EDs according to the characteristic oral manifestations. Regular dental consultations may provide opportunities for identifying warning signs-tooth erosion, xerostomia, and soft tissue lesions-which may indicate the need for referral for psychological or medical evaluation. Educational programs in the oral signs of EDs among dental practitioners increase their capabilities for early detection. This could also allow for improved overall patient outcomes and diminish the long-term effects of EDs on oral health.

**Strengths and Limitations**

The systematic review approach has ensured completeness in analyzing the existing literature and has given a comprehensive overview regarding the relation between EDs and oral health. The diversity in the study designs, populations, and geographical locations increases the generalizability of the findings. Duplicate removal and screening were made more accurate and

efficient by using Rayyan QCRI. However, only a limited number of studies that met the inclusion criteria allow broad conclusions to be drawn. Variability in study designs, sample sizes, and diagnostic criteria introduces heterogeneity that may affect the consistency of results. Some of the studies did not provide detailed information on certain oral health outcomes, which reduced the depth of analysis.

**Conclusion**

The review highlighted the strong association of EDs with oral health complications and the role of dental professionals in early detection and management. The high prevalence of tooth erosion, dental caries, and soft tissue lesions among ED patients justifies an integrated approach to care. Although the limited nature of the available literature restricts some generalizations, the results confirm that dental assessments are an important diagnostic tool in EDs and contribute to overall patient care. Further studies are required with larger samples and more consistent methodologies to help establish a clearer relationship between EDs and oral health.

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