



## Periodontal findings in Anorexia nervosa cases-A narrative review

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### Abstract

Periodontal disease is a common chronic disorder that is controlled by the host immune response to pathogenic bacterial colonization on the tooth surfaces. A balanced diet is important since nutrition plays an important role in immune system regulation. With a better knowledge of how the content of dietary intake influences various health outcomes, nutritional variety has been identified as a modifiable risk factor for periodontal disease. Periodontal diseases can be linked to eating disorders and varied dietary habits. In this regard, balanced and nutritious eating is critical to sustaining the symbiotic relationship between periodontal health and oral microbiota. The existence of eating disorders can have a severe influence on patients' dental health and is linked to the development of a number of issues, including periodontal disease. Nutritional and vitamin shortages can worsen periodontal disease in both cases. Anorexia Nervosa is disorder with progressive malnutrition which has a deleterious effect on the overall health of the affected person and in turn can have deleterious effect on the periodontal health as well. In this review, we have discussed the data regarding the effect of anorexia nervosa on the periodontal health.

**Keywords:** Anorexia Nervosa, Eating disorders, Periodontitis.

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### 1. Introduction

Eating disorders are described as eating behavior disorders that are connected with instability in the affected people's thoughts, actions, and attitudes causing major bodily and psychological harm. The causes of eating disorders is unknown, although it is thought to be multifaceted, with genetic, epigenetic, and environmental variables all contributing to a biopsychosocial condition [1]. Eating disorders are categorized into subthreshold disorders (specified / non-specified eating disorder) and full-threshold disorders, like rumination disorder, pica, avoidant/restrictive food intake disorder, bulimia nervosa, anorexia nervosa, and binge-eating disorder [2]. Anorexia nervosa is characterized by intense eating patterns, a fear of weight gain, a continuous drive to reduce weight, and an overvaluation of body form and weight with significant distortion of the body image. The incidence of this illness is often higher among young women

with higher socioeconomic strata, probably due to cultural and economic reasons; yet, the number of cases has increased in numerous nations [2]. Anorexia nervosa is defined by a severely low body weight for the individual's height, age, and developmental stage that is unrelated to other health concerns or food insecurity. Low body weight is connected with a continuous pattern of behaviors designed to impede normal weight reestablishment, which may include excessive dietary restriction, purging activities, and other self-harming behaviors.

### 2. Definition, pathogenesis, and epidemiology of anorexia nervosa

Anorexia nervosa is characterized by self-imposed starvation and severe weight loss, culminating in underweight for a person's age and height. Anorexia has the highest death rate of any mental disease other than opioid dependence

and can be dangerous if not treated. In a person with anorexia nervosa, the body mass index, a measure of weight for height, is often less than 18.5 [3]. The feeling of dissatisfaction with one's body, a key point in disease pathogenesis, may present several risk factors, or developmental (e.g., puberty), genetic (e.g., a genetic tendency to overweight) and may be triggered and aggravated by other variables such as temperamental and personality traits (e.g., dependency on others' approval; traumatic factors (e.g., physical and sexual abuse, serious negligence suffered during childhood; and family situations (enmeshment) [4].

Dieting behavior in anorexia nervosa is caused by a strong fear of gaining weight or becoming overweight. Although some anorexics claim to want and are attempting to gain weight, their behavior is inconsistent with this claim. They may, for example, eat just little amounts of low-calorie items and exercise extensively [3]. Some people with anorexia nervosa may binge eat and then purge through vomiting or laxative abuse. Anorexia nervosa is classified into two subtypes:

- Restrictive type, in which people lose weight largely by dieting, fasting, or severe exercise.
- Binge-eating/purging type in which people engage in intermittent binge eating and/or purging.

Some of the following symptoms may emerge as a result of hunger or purging behaviors over time:

- Heartburn and reflux (in those who vomit).
- Severe constipation, bloating and fullness after meals.
- Menstrual periods cease.
- Cold intolerance.
- Dizziness or fainting from dehydration.
- Severe constipation, bloating and fullness after meals.
- Stress fractures from compulsive exercise as well as bone loss resulting in osteopenia or osteoporosis (thinning of the bones).
- Brittle nails/ hair.
- Muscles wasting and weakness.
- Depression, irritability, anxiety, poor concentration and fatigue [3].
- Serious health conditions such as cardiac rhythm irregularities, especially in people who vomit or use laxatives, renal difficulties, or seizures, can be fatal.

Anorexia nervosa treatment is assisting persons affected in normalizing their eating and weight management behaviors and restoring their weight. A critical component of the treatment strategy is the medical diagnosis and treatment of any co-occurring mental or medical problems. The nutritional strategy should focus on reducing eating anxiety and practicing ingesting a diverse and balanced selection of foods with varying calorie densities at regular intervals. The most successful therapies for adolescents, young adults, and emerging adults entail assisting parents in supporting and monitoring their child's meals. Body dissatisfaction is as vital to address, although it generally takes longer to fix than weight and eating habits [3]. Models, athletes in sports requiring weight control (especially at the professional level), and subjects suffering from diet-related pathologies (such *Shetty et al., 2023*

as familial hypercholesterolemia, inflammatory bowel disease, type 1 diabetes) are at higher risk for either bulimia nervosa or anorexia but not binge-eating disorder. As a result of contributing variables (genetic, environmental), certain individuals may acquire varying levels of sensitivity to eating disorders [5]. This susceptibility may manifest as a consequence of triggering circumstances that result in a loss of "well-being" as a result of individual (mental or somatic) or interpersonal variables. An eating problem replaces the disrupted homeostasis, which may add to the mental condition's extension. Susceptibility levels and triggering factors differ in nature and intensity from subject to subject, explaining the condition's variable clinical manifestation in terms of age at onset, clinical symptoms, disorder intensity, duration of evolution, therapeutic response, or progression to chronic illness or other psychiatric disorders. To address the underlying symptoms of an eating disorder, the therapeutic plan must be multidisciplinary, incorporating psychologic, nutritional (handling malnourished or overweight individuals), social, somatic and familial components. The treatment approach is centred on coordinating the numerous parties involved over the course of the condition as part of a long-term programme. As an adjunct to psychotherapy treatment and nutritional methods, medications such as psychotropic (anxiolytic, and neuroleptic anti-depressant drugs) and different vitamins can be recommended [6]. Treatment regimens are more successful if they begin shortly after the beginning of eating disorders; recovery from eating disorders can take from months to years (around two-thirds after 5 years for anorexia nervosa and twelve years for bulimia nervosa). Eating disorders can have catastrophic repercussions, including high mortality rates (two to five times higher than the general population), with anorexia nervosa having the highest fatality rate of any mental ailment [7]. As a result, early detection of eating problems is crucial. Because of the specific clinical oral symptoms, dental health professionals are frequently the first to be consulted.

### **3. Impact of anorexia nervosa on oral mucosa**

A poor diet (vitamin inadequacies, excessive carbohydrate consumption), traumatic behaviours, hyposalivation, and poor oral cleanliness can all have a deleterious impact on the health of the oral mucosa [8]. Several deficiencies, including as calcium, potassium, and vitamins, are frequent in restrictive eating disorders. Very low vitamin C levels in the blood explain the prevalence of gingival bleeding, which is a symptom of scurvy and has been recorded in persons with anorexia nervosa [9]. Carbohydrates may constitute a greater proportion of total calorie intake in patients suffering from anorexia nervosa than in the general population as a whole [10].

### **4. Impact of anorexia nervosa on periodontium**

Studies have found that persons with eating disorders had lower as well as higher, plaque indices and gingival bleeding than controls. However, persons with eating problems have been shown to clean their teeth often (three times or more each day) [10-14]. Although the data on the relationship between eating disorders, dental plaque, and gingival inflammation is still inconsistent, there is a trend for greater rates of plaque and gingival inflammation in patients with eating disorders [15]. It has been observed that the periodontal impact of eating disorders is predominantly

caused by gingiva abrasion caused by obsessive toothbrushing (i.e., excessive and frequent brushing), leading in various sites of gingival recession. Poor diet and thin periodontal phenotypes are key risk factors. It has also been recognized that gingival inflammation in persons with eating disorders is exacerbated by the poor morphology of the cervical area, which has erosive tooth attrition.

The damaged cervical architecture suppresses food deflection, resulting in food, dental plaque, and, eventually, calculus deposition. However, those with eating disorders, particularly those suffering from anorexia nervosa, have a larger number of sites with a clinical attachment level of 3 mm or more. People with eating disorders are more likely than the general population to get gingival recession, instead of periodontitis [10,12]. In a study out of 33 outpatients with bulimia nervosa or anorexia nervosa had greater periodontitis than sex and age-matched controls; People with eating disorders, particularly those suffering from anorexia nervosa, have a larger percentage of sites with a clinical attachment level of 3 mm or more [16]. There are not many studies assessing the condition of alveolar bone density in anorexic patients. One study which assessed the bone mineral density in anorexia nervosa patients concluded that there weak relation between anorexia nervosa and bone mineral density which might have been due to the smaller number of sample in the study [17].

## 5. Biological impact of the anorexia nervosa on oral health conditions

### 5.1. Microbiota in cases with anorexia nervosa

Two studies by the same group reported no difference in the levels of *Streptococcus mutans* and *Lactobacillus* species in patients with anorexia nervosa compared to controls [10,12]. People with anorexia nervosa have lower intra-individual bacterial richness, a higher Bacteroidetes-to-Firmicutes abundance ratio, and significant changes in the relative abundances of several digestive bacteria when compared to healthy women, according to emerging evidence from gut microbiome studies [18-19].

### 5.2. Composition and flow rate of Saliva

Vomiting-related eating disorders are characterized by swelling of the parotid salivary glands [20]. In most cases, the salivary glands remain functioning properly. Submandibular gland involvement is uncommon. These symptoms may persist for months after the eating disorder has been treated. A patient with this clinical symptom may have a current or previous eating disorder. As a result, when conducting the interview with these patients, it is critical to keep this presentation in mind. In a study, hyposalivation, as evaluated by an unstimulated salivary flow rate, was observed in persons with anorexia nervosa [16]. The volume of unstimulated whole saliva was lower in patients with anorexia nervosa compared to healthy people, albeit this was mostly owing to medication [21]. However, no variations in stimulated salivary flow rate have been documented between patients with and without anorexia nervosa [10]. Hyposalivation may have a role in the progression of halitosis, plaque buildup, gingival irritation, dental caries, and erosion [22]. Furthermore, substantial increases in the concentrations of various salivary proteins, enzymes, and minerals in patients with eating disorders have been

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observed: total proteins, albumin, aspartate and alanine aminotransferases, collagenase, inorganic phosphate, chloride, and magnesium [1,11,21]. Despite fasting and the development of anorexia nervosa, essential salivary enzymes continue to function normally. This demonstrates the body's partial tolerance to harsh environments during starvation.

### 5.3. Systemic biomarkers of periodontal breakdown

In most instances, the salivary glands remain functioning, and elevated blood ferritin levels were associated with a generalized decreased periodontium [23]. Ferritin's primary function is iron storage, and it can operate as a positive acute-phase reactant. Ferritin is thought to be a sign of malnutrition.

## 6. Anorexia nervosa due to dental treatment

There are situations which show that dental treatment can cause weight loss and lead to anorexia nervosa. Two articles mentioned cases where dental treatment led to patients developing anorexia nervosa whereas a systematic review mentioned that the relationship between dental treatment and anorexia nervosa is not clear [24-26]. Awareness about eating disorders should be provided for parents of adolescents who are at risk for eating disorders, and also to their dentists.

## 7. Oral hygiene promotion and prevention of diseases in people with anorexia nervosa

Oral hygiene status in Anorexia nervosa patients is generally either very poor. Toothbrushing is frequently severe and these patients with anorexia nervosa and bulimia nervosa brush very frequently, and is used to cover shame after vomiting episodes, or even to trigger vomiting [27]. It is critical to instruct children to clean their teeth no more than three times every day. Instead of brushing, they should rinse their mouth with an acid-neutralizing solution or just use still water. Because stomach acids have a pH of 1.5 and have a negative influence on teeth, the patient should be urged to wait brushing for at least 1 hour after vomiting so that his or her toothbrushing behavior is no longer obsessive. Furthermore, individuals at risk of dental erosion should always utilize an extra fluoride source, such as fluoride-containing toothpaste and/or rinse [28]. Consultation devoted entirely to dental hygiene, including oral and written instructions, are required for individuals suffering from eating disorders. Oral Hygiene Routine Checklist for People with Eating Disorders:

- Delay brushing for at least 1 hour after vomiting.
- Limit toothbrushing to three times per day.
- Cleanse the mouth with an acid-neutralizing solution or only water.
- Use fluoride toothpaste and/or rinses (combined with stannous ions).
- Use an electrical toothbrush with a high-pressure monitoring system.
- Utilize a tongue cleaner to eliminate acid residue as quickly as possible after vomiting [2].

For plaque management, an electric toothbrush is suggested, and a system with an overpressure monitoring system is ideal. Based on clinical experience, we believe that emphasizing an atraumatic brushing style rather than frequency is generally more effective. Several research on eating disorders found that the average frequency of

toothbrushing was more than three times per day. The gingival phenotype should also be examined in order to determine the risk of gingival recession and to tailor oral care guidelines.

### 8. Periodontal therapy in people with anorexia nervosa

Controlling both local and systemic risk factors ought to be part of periodontal therapy, particularly in patients with eating disorders who have physical and/or mental comorbidities. Individuals with eating disorders who have the worst periodontal diseases usually have a thin gingival phenotype, a compulsive (i.e. frequent and traumatic) toothbrushing behavior, and several sites of dental erosion. A phase of initial therapy with personal and professional plaque control, a reevaluation, and a phase of periodontal plastic surgery aiming at root covering and increasing gingiva breadth are all part of the traditional therapeutic strategy. Periodontal plastic surgery in persons with eating disorders may be justified following a comprehensive assessment of the disease's stage of development [2]. According to one study of patients with eating disorders, third molar surgery caused an exacerbation or relapse of their disease [29-30]. As a result, persons with eating disorders should postpone surgical surgery if their third molars are asymptomatic. If surgery is required, the surgeon and other members of the psychotherapy team should create specific instructions for postoperative diet and behavior, as well as monitor the patient's nutritional state. Furthermore, dental practitioners should be aware that severe types of anorexia nervosa are associated with a calcium deficit, which necessitates the use of oral bisphosphonates, which raises the risk of medication-related osteonecrosis of the jaws.

### 9. Conclusions

The association between periodontal disorders and dietary habits clearly indicates that a well-balanced diet rich in nutrients and vitamins could serve as a preventative factor against periodontal disease and in a patient with Anorexia Nervosa the nutritional disturbances can lead to various effects on the well-being of the patient including deleterious effect on the oral cavity and periodontium. The most crucial job of the dental care provider when recognizing oriental indicators of eating disorders as the first health professional to notice them is to guarantee that the patient receives treatment. Implications for education include the addition of conceptual, skill based and procedural curricula objectives addressing etiologic assessment and patient communication, thereby increasing behavioral capacity for restorative care delivery and patient referral. Improving the level of oral care in people with eating disorders may contribute to better overall outcomes in nutritional and psychotherapeutic approaches.

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