



International Journal of Applied Dental Sciences

ISSN Print: 2394-7489
ISSN Online: 2394-7497
Impact Factor (RJIF): 7.85
IJADS 2025; 11(4): 100-103
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www.oraljournal.com
Received: 25-07-2025
Accepted: 28-08-2025

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Trichomonas tenax: Epidemiology, diagnosis, treatment, and oral manifestations

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DOI: <https://www.doi.org/10.22271/oral.2025.v11.i4b.2264>

Abstract

Introduction: *Trichomonas tenax* is a flagellated protozoan that colonizes the human oral cavity and has been associated with inflammatory processes in periodontal tissues. Its presence can contribute to the deterioration of the local immune system, causing tissue damage and, in chronic cases, tooth loss.
Objective: To evaluate the epidemiology, diagnosis, treatment, and systemic and oral manifestations related to *Trichomonas tenax*.

Methodology: Articles on the subject published in PubMed and Google Scholar databases were analyzed, with emphasis on the last 5 years. It was conducted using the words, "*Trichomonas*", "diagnosis", "epidemiology", "treatment", "oral manifestations".

Results: Global prevalence of *Trichomonas* is approximately 5.0% in women and 0.6% in men, with notable geographical variations, especially in Africa and the Americas, where rates range from 0.2% to 1.3%. Diagnosis is traditionally based on microscopic observation, although it can be difficult to differentiate *T. tenax* from *T. vaginalis*. The PCR-RFLP technique allows for more specific and accurate identification. Root planing and scaling has been shown to be an effective method for reducing the oral protozoan load, eliminating about 80%, with an estimated residual prevalence of 5% after treatment. In addition, *T. tenax* has been detected in patients with systemic diseases such as HIV/AIDS, rheumatoid arthritis, genetic disorders, and in kidney transplant recipients, where immunosuppression, either due to the disease or to treatments with steroids and cytostatics, favors its proliferation.

Conclusions: *Trichomonas tenax* is closely linked to poor oral hygiene and periodontal disease, with a higher prevalence in individuals with severe systemic pathologies. Scaling and root planing is an effective intervention for its control. Knowledge and early detection of this protozoan are essential for preventing oral and systemic complications.

Keywords: *Trichomonas tenax*, treatment, epidemiology, oral manifestations, diagnosis

1. Introduction

Trichomonas is a genus of protozoans comprising several species that parasitize different areas of the human body: *Trichomonas vaginalis* in the genitourinary tract, *Pentatrichomonas hominis* in the intestine, and *Trichomonas tenax* in the oral cavity, particularly among individuals with poor oral hygiene [1].

While direct microscopy is a common technique for identifying *Trichomonas tenax*, molecular methods like PCR-RFLP offer superior diagnostic accuracy. The primary transmission routes include saliva, saliva droplets, direct oral contact (e.g., kissing), and, in some instances, contaminated utensils or drinking water [2].

Understanding *Trichomonas tenax* is clinically important due to its links to oral pathologies like gingivitis and periodontitis, especially in patients with poor oral hygiene or underlying systemic conditions. Its timely detection using appropriate techniques enables accurate diagnosis and prevents unnecessary treatments. A lack of awareness about this parasite can lead to prolonged clinical interventions and increased public health costs [3].

This flagellate protozoan is potentially associated with inflammation of periodontal tissues and can contribute to tissue damage and tooth loss in the context of chronic infection, particularly when immunity is compromised [4].

Alongside *Entamoeba gingivalis*, *T. tenax* is one of the most common parasites in the human oral cavity.

These organisms typically inhabit tooth surfaces, gums, and periodontal pockets near the cervical regions of teeth, and are seldom found in the crypts of the tonsils [5]. Combined prevalence analyses have demonstrated an association between *T. tenax* and conditions such as candidiasis, gingivitis, and periodontitis [6]. Furthermore, previous research indicates a correlation between the severity of periodontitis and the detection of *T. tenax* in dental plaque samples [7].

Trichomonas tenax is frequently detected in individuals with periodontal disease and poor oral hygiene, as well as in those with various systemic disorders. This study aims to analyze its prevalence, optimize diagnostic methods, and evaluate treatment efficacy, with the goal of improving comprehensive dental care and mitigating the economic impact of related oral and systemic pathologies.

2. Methodology

Information from articles published in PubMed, Scopus and Google Scholar was analyzed, with emphasis on the last 5 years. The quality of articles was evaluated based on the standard guidelines, i.e., identification, review, choice and inclusion. The quality of the review was assessed using the measurement instrument for evaluating systemic reviews. The search was performed using the Boolean logical operators AND, OR and NOT. It was performed with the words "*Trichomonas tenax*", "diagnosis", "epidemiology", "oral manifestations", "treatment". The keywords were used individually, as well as each of them related to each other.

3. Results

3.1 Epidemiology

Multiple studies confirm that *Trichomonas tenax* has a global distribution, with a higher prevalence among populations with poor oral hygiene and periodontal disease [8]. A systematic review reported a pooled global prevalence of 17% (95% CI: 14-22%), with the highest rate in Chile (56%) and the lowest in Kenya (3%) [9]. An age-specific analysis identified individuals between 46 and 55 years as the most affected group, with a frequency of 15%. In a clinical study of 237 individuals comprising healthy patients, those with gingivitis, and those with periodontitis *T. tenax* was detected in 25.6% of periodontitis patients, 5.7% of those with gingivitis, and 47.9% of subjects without apparent periodontal disease [2].

Transmission most commonly occurs through direct saliva contact, such as kissing or exposure to droplets, though infections via contaminated drinking water or utensils have also been reported. Prevalence estimates in affected individuals vary widely, ranging from 4% to 53% [10].

Research in Lorestan Province, Iran (2021-2022), examined oral protozoa in 73 hemodialysis patients. Using microscopy and PCR, *T. tenax* was identified in 9.6% of participants and *Entamoeba gingivalis* in 17.8% [11]. While no significant associations were found with age, sex, or education, correlations were observed with infrequent tooth brushing and rural residence [12].

Current evidence establishes *Trichomonas tenax* as a common oral parasite in individuals with poor hygiene and periodontal disease, with significant variations in distribution across regions and demographic groups. Saliva contact is the

primary mode of transmission, though indirect acquisition via contaminated water or objects is possible.

3.2 Diagnosis

Diagnosing *Trichomonas tenax* in the oral cavity employs various techniques. Although direct microscopy is traditionally used, it is laborious and lacks the specificity to differentiate morphologically similar species like *T. tenax* and *T. vaginalis* [13]. *In vitro* culture offers comparable sensitivity to direct observation but does not significantly improve accurate identification [14].

In contrast, molecular techniques such as real-time PCR-RFLP have demonstrated greater diagnostic efficacy. A study of 747 samples from the Brazilian Public Health System found *Trichomonas* in 2.81% of cases using fresh preparation and culture, while the Allplex™ kit (Seegene®) detected the protozoan in 3.88% of samples, confirming its higher sensitivity [16, 17].

Thus, while direct microscopy remains common, molecular methods like PCR-RFLP represent more accurate and reliable tools for the specific identification of *Trichomonas tenax*.

3.3 Treatment

The association between *Trichomonas tenax* and periodontal disease has driven the search for effective treatments. Among non-surgical interventions, scaling and root planing (SRP) is notable for reducing microbial load and improving gingival health [18]. This procedure, performed with manual curettes and/or ultrasound, has been shown to eliminate approximately 80% of protozoa, reducing residual prevalence to about 5% and significantly decreasing subgingival biofilm [19]. One study found that SRP reduced *T. tenax* in saliva, though not significantly in dental plaque at sites with clinical attachment loss greater than 5 mm [20].

Nitroimidazoles like metronidazole and tinidazole have been the standard pharmacological treatment for trichomonadal infections for decades. However, drug resistance poses a challenge in persistent cases. One reported clinical case achieved therapeutic success using a prolonged course of oral secnidazole combined with intravaginal boric acid; secnidazole received FDA approval in 2021 for treating trichomoniasis in men and women [21].

These findings support the role of SRP in managing oral protozoa, while underscoring the need for effective pharmacological alternatives for resistant infections.

3.4 Manifestations

A study at the University of Babylon, Iraq (October 2017-April 2018), detected *Trichomonas tenax* in the dental plaque of 16.08% of 230 patients (130 men, 100 women) [22]. These results confirm that *T. tenax* is part of the normal oral microbiota, typically without causing major health issues. However, conditions like diabetes, hypertension, smoking, and heart disease can elevate the risk of gingivitis and periodontitis, particularly in immunocompromised individuals [23].

T. tenax has also been reported in patients with systemic diseases such as HIV/AIDS, rheumatoid arthritis, kidney transplants, and genetic disorders. In these cases, impaired immune function due to the disease itself or treatments like steroids and immunosuppressants creates an opportunity for opportunistic parasitic infections [24]. A comparative study found a higher, though not statistically significant, prevalence of *T. tenax* in patients with chronic systemic diseases compared to healthy individuals, suggesting that chronic

medication might have an inhibitory effect ^[11].

In the oral cavity, a study of 141 subjects (40 with healthy implants and 101 with peri-implantitis) detected *T. tenax* in 34 patients with peri-implantitis, while no protozoa were found in healthy implants ^[25]. This finding highlights a significant association between *T. tenax* and inflammatory oral diseases like peri-implantitis and periodontitis, including acute and chronic gingivitis ^[26]. The detection of this protozoan in dental plaque underscores its potential role in the pathogenesis of these conditions.

In summary, while *Trichomonas tenax* is a common oral commensal, its prevalence increases in patients with systemic diseases and periodontal pathologies. Its identification is crucial for preventing and managing oral infections, especially in vulnerable populations such as hemodialysis patients or those who are immunocompromised.

4. Conclusions

Trichomonas tenax is a protozoan that inhabits the oral cavity and is most commonly found in individuals with poor oral hygiene and periodontal disease. It can be diagnosed using microscopy or more advanced molecular techniques. The main treatment consists of scaling and root planing to eliminate the parasite's habitat. Although it does not usually cause serious complications, its prevalence increases in patients with systemic diseases, and cases have also been reported in endodontic infections. Maintaining proper oral hygiene is essential to prevent colonization and possible associated complications.

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How to Cite This Article

Benitez Santos A, Garcia Moyeda AL, Juarez Ibarra KI, Capetillo Hernandez GR, Torres Capetillo EG, Cholico Rodriguez HP, Espinosa de los Monteros Godinez MM, Martinez Martinez DE, Solis Soto JM. *Trichomonas tenax*: Epidemiology, diagnosis, treatment, and Oral manifestations. International Journal of Applied Dental Sciences. 2025;11(4):100-103.

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