



Study of Oral Parasite Infection in University and School Students in Al Kut City

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Abstract

The Parasitology Laboratory at the University of Wasit's College of Science conducted research on the *Entamoeba gingivalis* and *Trichomonas tenax*, two oral parasites, between November 2025 and May 2026. pupils from the University of Wasit as well as male and female elementary and secondary school pupils participated in the study. Using direct smears and wet slide preparation, one hundred saliva, mouthwash, and gingival smear samples from a variety of age groups (10–40 years) were investigated. The total *Entamoeba gingivalis* infection rate was 55%, but the *Trichomonas tenax* infection rate was 2%, according to the data. Males aged 10 to 15 had the highest infection rate (70%), whereas females aged 31 to 35 had the highest infection rate (100%) with *Entamoeba gingivalis*. Gingivitis and oral amoebiasis were shown to be associated at a rate of 25%, but among individuals with dental caries but healthy gums, this number rose to 75%. Statistically significant differences were determined at the probability level ($p < 0.05$). The incidence of oral parasites has not yet been linked to smoking, diabetes, socioeconomic position, or educational attainment, according to this study.

Keywords: *Entamoeba gingivalis*, *Trichomonas tenax*, Gingivitis, Oral parasites, Saliva samples

Introduction

About 5–20% of people worldwide suffer with gingivitis, one of the most prevalent illnesses (Maybodi et al., 2016). There are two phases to gingivitis. Comprehensive dental protection can treat this condition, which is caused by germs in the first stage. Inflammation of the supporting tissues of the tooth—the periodontal ligament and alveolar bone—below the tooth is an advanced stage of periodontitis. This inflammation is caused by various Microorganisms, especially motile bacteria, parasites, fungi, addition to viruses (Moussaad et al., 2019). Several genetic and environmental factors also contribute to its development, including diabetes, smoking, and immunodeficiency conditions associated with Decreased production of interleukin-1 (Ismail et al., 2016).

Periodontitis is associated with a wide range of microorganisms, with Gram-negative bacteria accounting for approximately About 74% of the cases, Along with some Gram-positive species such as Streptococcus, (Munsch et al., 2019). Most microorganisms It plays a role in chronic periodontal are

anaerobic, representing approximately 90% of the bacteria causing the disease. The most common clinical manifestations of periodontitis are bleeding gums, especially during brushing, as well as redness and swelling of the gums, which, if left untreated in advanced stages, can lead to tooth loss (Perez et al., 2019). Among the most important parasites associated with periodontal diseases, *Trichomonas tenax* and *Entamoeba gingivalis* are considered to be of particular importance. Due to the limited and scarce data and information available on the spread of these oral parasites in Al-Kut, there is a need to study their epidemiological characteristics, assess their potential effects, and explore appropriate preventive and therapeutic methods to reduce their impact.

Entamoeba gingivalis and *Trichomonas tenax* are part of the oral flora, but under some circumstances, they have been connected to gingivitis and periodontitis (Yaseen et al., 2021). The occurrence of these parasitic organisms is higher in individuals who maintain poor oral hygiene habits (Aciöz et al., 2025). *Entamoeba gingivalis* is of particular historical interest, as it was the earliest amoeba reported from human dental plaque.

These parasites reside in the oral cavity between the teeth and gums. During their life cycle, only the trophozoite stages are formed; cysts are not. These motile stages, ranging in size from 7 to 20 micrometers, are highly mobile under a microscope. Their high phagocytic activity can damage periodontal tissues. The presence of *E. gingivalis* in 77% of samples taken from areas affected by periodontitis and 22% of samples taken from healthy areas is indicative of this bacterium causing periodontitis (Tonetti et al., 2017).

The *Entamoeba gingivalis* parasite has been reported to possess virulence factors similar to those of *E. histolytica*. Its pathogenic effect is attributed to its ability to invade and destroy tissues by affecting the growth of gingival epithelial cells (Bau et al., 2020). Direct contact between individuals is the most common mode of transmission for this parasite, although contaminated food and beverages and commonly used utensils may also play a role.

Another protozoan relevant to oral health is the parasite *Trichomonas tenax*. This organism exists only in its trophozoite stage and typically measures between 6 and 10 micrometers. A key characteristic of its virulence is its high motility, which relies on five flagella for locomotion (Yassin et al., 2021). *Trichomonas* species have also been identified in lung tissue; however, recent studies have revealed some biochemical differences between oral and lung isolates (Tonetti and Van Dyke, 2013).

Previous investigations have indicated that the prevalence of *E. gingivalis* among dental patients ranges from 31.6% to 71.7%, whereas the prevalence of *T. tenax* ranges from 12.2% to 35% (Badrasawi & Basha, 2025; Onyido et al., 2011). In Turkish patients diagnosed with gingivitis and periodontitis, the reported prevalence rates of *E. gingivalis* and *T. tenax* were 35% and 2.8%, respectively (Yazar et al., 2016). Several factors related to inadequate oral hygiene may contribute to the occurrence of these protozoan parasites, which have frequently been linked to gingivitis and periodontal diseases (Yazar et al., 2016).

Materials and Methodology

Sample collection

The study included collecting a total of 100 saliva and gingival swabs from male and female students of Wasit University, ranging in age from 10 to 40 years, between November 2025 and February 2026. Samples were also taken from several primary and intermediate schools. The study aimed to investigate the prevalence of oral parasites, particularly the epidemic *Entamoeba gingivalis* and *Trichomonas tenax*, in the city of Kut. Samples were collected from individuals suffering from periodontal disease and inflammation, or those undergoing tooth extractions. Relevant demographic and clinical information was recorded using a structured questionnaire, including the participant's name, age, sex, and health status.

Examination Procedure:

Physical Examination:

This examination involves assessing the presence of dental calculus deposits, greenish accumulations within the gingival tissues, the extent of tooth deterioration, as well as evaluating the color and consistency of the gums and the whitish deposits present on tooth surfaces (Carranza, 2002).

Microscopic analysis can be classified as:

The Direct Smear Method:

Gingival specimens were obtained directly from the oral cavity, particularly from areas exhibiting green discoloration associated with inflamed gingival tissues, or from regions adjacent to dental caries in individuals with healthy gums. A drop of either iodine or regular saline staining solution was applied to a glass slide to prepare each sample, which was then examined under a light microscope at low and high magnifications ($\times 40$ and $\times 100$). All samples were examined within a period not exceeding 30 minutes from the time of collection, with confirmation of the presence of parasite movement., (Luszczak et al., 2016).

Wet preparation technology:

Two oral parasites, *Entamoeba gingivalis* and *Trichomonas tenax*, were diagnosed by placing a sample of saliva on a clean, sterile glass slide, mixing it thoroughly, and covering it with a glass lid. The slides were then examined using a light microscope at low and high magnifications ($\times 40$ and $\times 100$). In the moist preparations, the motile stages of *T. tenax* exhibited rapid, undulating movement, and its anterior tuft was distinguishable by the presence of a wavy membrane and flagella. The positive diagnosis of the sample was confirmed by identifying the characteristic morphological features of the parasite, such as its size, shape, number of flagella, and the distinctive appearance of the nucleus. (Luszczak et al., 2016).

Examination of saliva-containing mouthwash samples

Patients' saliva-rich mouthwash samples were taken, put into sterile tubes, and centrifuged for five minutes at 3000 rpm. Patients' saliva-rich mouthwash samples were taken, put into sterile tubes, and centrifuged for five minutes at 3000 rpm. After discarding the supernatant, a drop of iodine stain was placed on a glass slide, followed by the addition of the sediment and covering with a coverslip. The prepared slides were examined under a light microscope using low and high magnifications ($\times 40$ and $\times 100$) (Tonetti et al., 2017).

Statistical Analysis

Data analysis was performed using SPSS software (9) The Chi-square test was used to assess differences between study groups, and statistical significance was defined at $P \leq 0.05$.

Results

Rate of Total Infection

Table (1) shows that the overall oral parasite infection rate was 57%, with *T. tenax* accounting for 2% of cases and *E. gingivalis* for 55%. Higher percentages have been reported in certain studies (Norberg et al., 2014; AlSaeed & Mahmood, 2020), Data on oral parasite infection was gathered in the city of Al Kut. The percentages ranged from 12 to 32 percent. The results of this study show that the prevalence of *E. gingivalis* infection was 55% higher than that of *T. tenax* parasite infection, that was 2%. This was consistent with the findings of other research, including, (Al-Himyari et al., 2011). The results of the present study showed that the infection rate of *Trichomonas tenax* was 22.53%, while *Entamoeba gingivalis* exhibited a higher infection rate of 31.37% (Sahar, 2013), These findings differ from those of other studies, which reported a prevalence of 2% for *T. tenax* and 10% for *E. gingivalis*.

Both *E. gingivalis* and *T. tenax* are oral parasites with similar transmission routes and are considered indicators of periodontal disease, poor oral hygiene, and insufficient dental care. Transmission may occur through direct contact such as kissing, or indirectly via sharing eating and drinking utensils.

The variation in infection rates between the current study and previous reports may be attributed to several factors, including environmental conditions, personal hygiene and health consciousness levels, differences in sample size, diagnostic and examination methods, as well as the accuracy and expertise of the examiner.

Table (1) : Distribution of *Entamoeba gingivalis* and *Trichomonas tenax* infection by age group in Al-Kut city

Age group	The suspected infection	<i>Entamoeba gingivalis</i>		<i>Trichomonas tenax</i>		The sample Total	
		Infect ed samples	percenta ge (%)	Infect ed samples	percent age (%)	Infect ed samples	percent age (%)
(10-15)	34	22	65.5	0	0	22	65.5
(16-20)	19	9	46.3	0	0	9	46.3
(21-25)	19	9	46.3	2	6.2	11	5.2
(26-30)	15	9	60	0	0	9	60
(31-35)	4	3	70	0	0	3	70
(36-40)	9	3	33.3	0	0	3	33.3
The total	100	55	55	2	2	57	57

*** Between the two parasite infestations, there are significant differences ($p < 0.05$).**

Epidemiology by Age

The present study indicated a significant association between oral parasitic infection rates and age distribution (Table 1). The highest prevalence of *Entamoeba gingivalis* (65.5%) was observed in the 10–15-year age group, while the overall highest infection rate (70%) was recorded among older individuals. In contrast, the highest prevalence of *Trichomonas tenax* (6.2%) was detected in the 21–25-year age group. These results are consistent with the findings of previous studies. (Al-Saeed & Mahmood, 2020; Al-Qassas, 2014).

The higher incidence among younger age groups may be attributed to the presence of newly erupted and developing teeth, which provide suitable conditions for parasite colonization. A lack of awareness regarding proper oral hygiene practices may also contribute to the increased likelihood of infection.

irregular teeth cleaning, excessive consumption of sugary foods, and neglect of regular dental checkups may contribute to an increased likelihood of developing dental problems in this age group.

Conversely, the higher prevalence observed in the 31–35-year age group may be attributed to increased exposure to risk factors such as smoking, alcohol consumption, and consumption of contaminated food. These factors create favorable conditions for oral diseases, including fungal infections and parasitic colonization.

Epidemiology by Gender

In the 10-15 age group, the infection rate was 70%, while the 36-40 age group had the lowest infection rate at 30%. The study also showed that infection is affected by age. According to (Table 2), and contrary to the study by (Al-Himyari et al., 2011), which found that 20-year-olds had the highest infection rate, the results showed that males had the highest infection rate. The 30-35 age group had the highest infection rate among females, at 100%, while the 36-40 age group had the lowest, at 30%. Infection rates were found to increase with age. According to (Table 3), The infection rate of *T. tenax* was 12% among the 21–25 age group.

Table (2): Infection Rates of *Entamoeba gingivalis* according to sex

Age group	Females			Males		The total sample			
	The suspected infection	Infected samples	percent age (%)	The suspected infection	Infected samples	percent age (%)	The suspected infection	Infected samples	percent age (%)
(10-15)	19	14	70	15	10	66.6	34	24	67.5
(16-20)	8	4	50	11	5	45.4	19	9	47.3
(21-25)	9	5	55.5	10	4	40	19	9	47.3
(26-30)	6	4	66.6	9	5	55.5	15	9	60
(31-35)	2	1	50	2	2	100	4	3	75
(36-40)	6	2	30	3	1	31.3	9	3	33.3
The total	50	30	53	50	27	32	100	57	50

The differences between infections in men and women were significant ($p < 0.05$).

Table (3) : Infection Distribution of *Trichomonas tenax* According to Gender

Age group	Females			Males		The total sample			
	The suspected infection	Infected samples	percent age (%)	The suspected infection	Infected samples	percent age (%)	The suspected infection	Infected samples	percent age (%)

(10-15)	19	0	0	15	0	0	34	0	0
(16-20)	8	0	0	11	0	0	19	0	0
(21-25)	9	0	0	10	2	12	19	2	6.2
(26-30)	6	0	0	9	0	0	15	0	0
(31-35)	2	0	0	2	0	0	4	0	0
(36-40)	6	0	0	3	0	0	9	0	0
The total	50	0	0	50	2	4	100	2	2

*** The differences were not statistically significant ($p < 0.05$).**

Infection-Related Diseases

Table (4) shows that 25% of oral amoeba were found in people with gingivitis, whereas 75% were found in people with healthy gingiva but dental caries. These results corroborated those of (Abualqomsaan et al. 2010), who found that those with dental problems are more likely to have the parasite *Entamoeba gingivalis* than *Trichomonas tenax*. They also supported (Al-Sultani & Al-Quraishi's, 2014) findings. who found that gingivitis and the parasite *Entamoeba gingivalis* were clearly related. They differed, although, with (Nocito & Vasconi, 2003), who discovered that 62.5% of people had healthy gums and 81.4% of them had diseased ones.

Table (4) : Oral Parasite Infection Symptoms

* There differences at	Age group	Number of suspected samples	Individuals infected with gingivitis	percentage (%)	Individuals with tooth decay	percentage (%)	were significant ($p < 0.05$).
Sample Collection The samples study consisted of and saliva results indicate that potential reservoir. These findings reported in (Trim et they are consistent Mahmood, 2020). relationship parasite detection. identification of the gingival swabs	(10-15)	34	7	18.6	27	82.3	Sites in the Study: analyzed in this direct oral swabs specimens. The saliva may act as a for the parasite. contradict those all., 2011). while with, (Al-Saeed & which found no between saliva and In addition, the parasite in direct supports the
	(16-20)	19	5	27.3	14	72.6	
	(21-25)	19	4	15.7	15	83.2	
	(26-30)	15	3	13.3	12	85.6	
	(31-35)	4	2	50	2	50	
	(36-40)	9	4	45.4	5	55.5	
	The total	100	25	25	75	75	

observations of (Al-Saeed & Mahmood, 2020). However, these outcomes differ from those of (Nocito & Vasconi, 2003), who reported that the parasite is found at a depth of 4–7 mm within gingival tissues, a result later confirmed by (Ibrahim & Abbas, 2012). The differences recorded may be due to differences in laboratory procedures followed, methods of sample collection, and diagnostic techniques used.

The relationship between the parasite and other influencing factors

Several studies have indicated an association between oral parasite infection and certain health conditions, including smoking, diabetes, and hypertension. However, this association was not observed in the current study. Because the individuals with oral parasites did not exhibit any of these conditions or symptoms, this association was not noted in the current study. These results are consistent with those of (Trim et al., 2011). but differ from those of (Al-Ta'I, 2020). Furthermore, the current study did not show a significant relationship between the prevalence of oral parasites and educational level. This may be attributed to the fact that the samples were collected from students in different grade levels, suggesting that educational level was not a significant factor in the rate of oral parasite infection. These results are consistent with those of (Gabanshi et al., 2010). However, (Kadir & Al-Mashhadani, 2007). found a favorable correlation between the prevalence of oral parasites and lower educational levels.

Discussion

The results showed that the overall prevalence of *Entamoeba gingivalis* infection was 55% (Table 1). This finding was close to that reported by, (Hammadi & Obaid, 2008). in Najaf, who recorded an infection rate of 58.3%. The prevalence observed in the present study was higher than those reported by, (Ibrahim & Abbas, 2012). in Baghdad (35%), (Naimi, 2017). in Babel (43%) and Mosul (45.45%), (Al-Buquerque et al., 2011). On the other hand, lower prevalence rates were found compared with the studies of (Athari et al., 2007), which reported a prevalence of 77%, and (Ghadirzadeh et al., 2025). in Iran, in which the prevalence arrived at 66.7%. The results also revealed a single infection rate of 2% for *Trichomonas tenax*, which was in agreement with the findings of (Abualqomsan et al., 2010).

The results revealed that the prevalence of *Trichomonas tenax* infection was 2%, which was close to the prevalence reported by (Al-Saeed & Mahmood, 2020). in Baghdad (3%). In comparison with studies conducted in other countries, the prevalence observed in the present study was markedly lower than that reported by (Alsaed et al., 2008). in Egypt (20%), (Ghadirzadeh et al., 2025). in Iran (33.3%), and (Norberg et al., 2014). in Brazil (51%). (Ismail et al., 2016). suggested that the detection of these oral protozoa may reflect oral and dental health conditions. Although these organisms were traditionally considered non-pathogenic (Al-Qassas, 2014), subsequent studies have indicated a possible association between their presence and periodontal diseases, gingival bleeding, and bad dental hygiene status (Al-Himyari et al., 2011).

The results showed that the infection rate among males was 57%, exceeding the infection rate among females by 37%. These results are consistent with those of several previous studies, including the study conducted in Babylon, (Al-Saeed & Mahmood, 2020). the study carried out in Nigeria, (Al-Qassas, 2014). and the study completed in Kirkuk, (Kadir & Al-Mashhadani, 2007). the study conducted in Baghdad by (Al-Sultani & Al-Quraishi, 2014). and the study conducted in Nigeria by (Onyido et al., 2011). These results, however, are at odds with those of the studies conducted by (Al-Moussawi et al., 2009; Khan, 2008). Studies conducted in Karbala and Najaf City (Hammadi & Obaid, 2008). No significant relationship was observed between infection prevalence and gender (Table 2). The lower infection rate recorded among females could be explained by their higher level of awareness regarding oral health and their greater commitment to maintaining oral and dental hygiene, which may reduce the likelihood of infection. Compared to men, women often have more time, are more comfortable, and spend more time at home. Furthermore, compared to men, women typically have more robust immune systems against a

variety of illnesses (Khan, 2008), It's important to note that because guys spend a lot of time outside, they are frequently exposed to things like alcohol, contaminated food, and smoking, which may create an environment that is conducive to gingival amoeba parasite infection, (Al-Saeed & Mahmood, 2020). The present results were in agreement with previous findings The current results are consistent with what previous studies have reported, (Al-Qassas,2014;Khan,2008). which reported the parasite only among females (Table 3) . Comparable results were documented in Babylon, (Al-Himyari et al., 2011) , Libya (Younis & Elamami, 2019), Mosul (Hamad et al., 2012), Najaf, (Norberg et al., 2014) , and Poland (Ghabanchi et al., 2010) , (Kadir & Al-Mashhadani, 2007). in Najaf, and other studies matched Table (2). Several studies have demonstrated that the spread of oral parasites like *E. gingivalis* is facilitated by poor oral hygiene, progressive deterioration of connective tissue and its fibers, accompanied by calcification processes (Mushtağ & Al-Abboodi, 2024; Onyido et al., 2011).

Conclusion

The present study investigated the prevalence of oral protozoan parasites, particularly *Entamoeba gingivalis*, among students from Wasit University as well as primary and secondary schools in Al-Kut City. The results demonstrated that *E. gingivalis* was detected more frequently than *Trichomonas tenax* and was commonly associated with dental caries and gingival inflammation. A higher rate of infection was observed among males compared with females, with prevalence varying according to both age group and sex. The results of saliva and gingival swabs showed that oral protozoa can be detected efficiently using both direct examination and wet preparation techniques in the diagnosis of oral protozoa. Furthermore, the results did not show a significant association between oral parasitic infection and certain factors, including diabetes, smoking habits, and educational level. These findings emphasize the importance of maintaining proper oral hygiene practices and regular dental care to reduce the occurrence and transmission of oral parasitic infections

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