

# Prevalence of Entamoeba Gingivalis and Trichomonas Tenax among Nursing Staff and Students: Study their Relationship with Some Health Parameters

Entamoeba  
Gingivalis and  
Trichomonas  
Tenax among  
Nursing Staff and  
Students

Wijdan Dhaidan Shnain Al-Abbas<sup>1</sup>, Kawther Alqaseer<sup>1</sup>, Ohood Aqeed Radhi<sup>2</sup>  
and Nadia Habeeb Sarhan<sup>1</sup>

## ABSTRACT

**Objective:** To investigate the prevalence of Entamoeba Gingivalis and Trichomonas Tenax among nursing staff and students: study their relationship with some health parameters

**Study Design:** Descriptive study

**Place and Duration of Study:** This study was conducted at the Nursing College, Kufa University of Najaf City, Iraq, from 1<sup>st</sup> January 2026 to 31<sup>st</sup> March 2026.

**Methods:** A total of 100 participants consisting of staff and students of both males and females from 19 to 50 years were enrolled.

**Results:** There were 58.9% non-infected and 50%, 42.9% were shown with Trichomonas Tenax and Entamoeba Gingivalis respectively. In the 19-34-year age group, 44.4%, 41.7% were infected with Entamoeba Gingivalis and both male and female recorded 33.3% with Trichomonas Tenax. Also, in the 35-50 years' group, 55.6%, 58.3% were noticed with Entamoeba Gingivalis and 66.7%, with T. tenax for both male and female. In contrast, all participants in the non-infected group, both males and female (100%), exhibited normal amylase levels, with no cases of elevated amylase. Furthermore, for males and females with parasitic infections, no significant associations were found ( $p > 0.05$ ), with sinusitis, pharyngitis, nasal allergy, and gingivitis in both sexes in relation with malondialdehyde.

**Conclusion:** No significant difference in terms of oral parasite infections within the educated population. The health parameters did not show statistically significant results related to these infections, which may be due to factors such as the severity of the infection, sample size, and the population's level of awareness. However, the presence of disturbances in the parameters (either high or low) compared to normal values suggests the need for further research. This is particularly important for all population groups, especially those with periodontitis and poor oral hygiene, as studying the relationship between these parameters and the two parasites could serve as an important indicator.

**Key Words:** Prevalence, Entamoeba Gingivalis, Trichomonas Tenax, Alpha-amylase, Malondialdehyde.

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## INTRODUCTION

Entamoeba Gingivalis and Trichomonas Tenax are protozoan parasites that inhabit the human oral cavity, and possibly those of domestic animals, as noted in existing research. Since their discovery, numerous studies have shown a strong link between periodontal diseases such as caries, gingivitis, and periodontitis and

both of these protozoa<sup>1</sup>. The prevalence of these parasites is often associated with factors like deficient oral hygiene, older age, tartar and calcareous deposits being present, and dental disease. To thrive, these protozoa rely on a variety of food sources, including epithelial cells, food fragments, microorganisms, hemocytes and white blood cells<sup>2</sup>.

Although T. tenax and E. gingivalis are not usually considered harmful protozoa, their presence in the mouth could indicate underlying oral issues like gingivitis or oral trichomoniasis. However, more studies are needed to completely understand these protozoa, their role, also their connection to more risk factors, as they might be a major reason of various problems of orally health<sup>3</sup>.

Salivary alpha-amylase is basically an enzyme already present in the human saliva that is an essential role for starch digesting. Besides its role in digesting carbohydrates, salivary alpha-amylase has garnered

1. Lecturer / Assistant Dean<sup>2</sup>, Department of Basic Science, Nursing College, University of Kufa, Iraq.

Correspondence: Kawther Alqaseer, Lecturer, Department of Basic Science, Nursing College, University of Kufa, Iraq.  
Contact No: 07815150315  
Email: kawthera.hasan@uokufa.edu.iq

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interest for its potential involvement in various pathophysiological processes, including gums disease<sup>4</sup>. Amylase is a vital protein released in both saliva and serum as part of the body's immune response to periodontal disease<sup>5</sup>.

Oxidative stress occurs when there's an imbalance between reactive oxygen species (ROS) and antioxidants in the body, leading to cell damage<sup>6</sup>. Malondialdehyde is a key marker used to measure oxidative stress and antioxidant levels<sup>7</sup>.

Oral parasites typically emerge when a person overlooks or is unaware of existing oral health issues<sup>8</sup>. The present study was conducted to investigate oral parasites in an educated population, specifically the staff and students of the nursing college, and to examine certain parameters.

## METHODS

This descriptive study was conducted at Nursing College, Kufa University of Najaf City, Iraq from 1<sup>st</sup> January 2026 to 31<sup>st</sup> March 2026 vide letter MDA-KU-901 /Approval/JSDJNEHU dated December 28, 2025. A total of 100 participants consisting of staff and students of both males and females from 19 to 50 years were enrolled.

At room temperature (25-28°C), the saliva was diluted using normal saline in a sterilized cup, were stained with Giemsa stain immediately after dilution. Then swabs were immersed in a solution (saliva sample with normal saline), and the swab was rolled onto a slide. A light microscope (40×-400×) was used to investigate these parasites in samples. Saliva were gathered in a quiet room at 8 AM to 12 PM. Participants were instructed to abstain from eating or drinking for at least a one hour before the examination. After this waiting period, they rinsed their mouths with water sundry times and waited 1-2 minutes until the water was clear before the saliva collection began. Then at 4,000 rpm for 10 minutes the samples were centrifuged, and stored in small Eppendorf tubes at -20°C until analysis.

Salivary malondialdehyde levels (nMol/ml) were measured using a method where malondialdehyde reacts with Thio Barbituric Acid, producing a pink-colored complex. This complex was analyzed spectrophotometrically, with absorbance readings taken at 532 nm. For salivary alpha-amylase (U/ml) analysis, the Amylase-Test Wako (Osaka, Japan) was used. The manufacturer's instructions. (FUJIFILM Wako Pure Chemical Corp). Participants aged between 19 and 50 years who do not have any chronic or systemic diseases, such as diabetes or cardiovascular issues, signs of gingivitis, sinusitis, pharyngitis, or allergies were included. Individuals with systemic conditions,

such as diabetes or heart disease, pregnant or breastfeeding women, used antibiotics or anti-inflammatory medications in the past three months, or have undergone periodontal treatment in the last six months were excluded. The data was analyzed through SPSS-26. For qualitative data, Chi-square (non-parametric test) was used. Statistically significant was considered at  $P \leq 0.05$ .

## RESULTS

There were 73% non-infected with parasites, while 21% had *E. gingivalis* infections and 6% had *T. tenax* (Table 1). Table 2 observed the males, 58.9% were non-infected and 50% were infected with *T. tenax*, while females represented 41.1% of the non-infected group and 50% of the infected group ( $P > 0.05$ ). In males, 42.9% were an infected with *E. gingivalis* but 57.1% were infected group ( $P > 0.05$ ). Table 3 showed in the 19-34-year age group, among males 44.4% were recorded with *T. tenax* and 33.3% with *E. gingivalis*. On the other hand, in the 35-50years' group, 55.6% were infected with *T. tenax* and 66.7% with *E. gingivalis*, no statistically significant. Regarding females, in 19-34-year age group, 41.7% of infections were due to *T. tenax* and 33.3% to *E. gingivalis*. In the 35-50years' group, 58.3% were infected with *T. tenax* and while 66.7% with *E. gingivalis* statistically not significant ( $P < 0.05$ )

**Table No. 1: Frequencies of parasite (N=100)**

| Type of infection    | No. | %    |
|----------------------|-----|------|
| Non-Infected         | 73  | 73.0 |
| Entamoeba Gingivalis | 21  | 21.0 |
| Trichomonas Tenax    | 6   | 6.0  |

**Table No. 2: Relationship between sex and Trichomonas Tenax Infection (N=79) and Entamoeba Gingivalis Infection (N=94)**

| Variable             | Normal Level  | High Level    | Total         | Chi-square (df) | P-value (Sig.) |
|----------------------|---------------|---------------|---------------|-----------------|----------------|
| Trichomonas Tenax    |               |               |               |                 |                |
| Male                 | 43<br>(58.9%) | 3<br>(50%)    | 46<br>(58.2%) | 0.181<br>(1)    | 0.671<br>(NS)  |
| Female               | 30<br>(41.1%) | 3<br>(50%)    | 33<br>(41.8%) |                 |                |
| Entamoeba Gingivalis |               |               |               |                 |                |
| Male                 | 43<br>(58.9%) | 9<br>(42.9%)  | 52<br>(55.3%) | 0.699<br>(1)    | 0.192<br>(NS)  |
| Female               | 30<br>(41.1%) | 12<br>(57.1%) | 42<br>(44.7%) |                 |                |

**Table No. 3: Relationship between age groups (years) and parasitic infection among males (N=12) and females (N=15)**

| Variable           |         | Parasitic Infection |           | Total     | Chi-square (df) | P-value (Sig.) |
|--------------------|---------|---------------------|-----------|-----------|-----------------|----------------|
|                    |         | E. gingivalis       | T. tenax  |           |                 |                |
| Male age (years)   | 19 – 34 | 4 (44.4%)           | 1 (33.3%) | 5 (41.7%) | 0.114 (1)       | 0.735 (NS)     |
|                    | 35 – 50 | 5 (55.6%)           | 2 (66.7%) | 7 (58.3%) |                 |                |
| Female age (years) | 19 – 34 | 5 (41.7%)           | 1 (33.3%) | 6 (40%)   | 0.175 (1)       | 0.675 (NS)     |
|                    | 35 – 50 | 7 (58.3%)           | 2 (66.7%) | 9 (60%)   |                 |                |

**Table No. 4: Relationship between disorders and parasitic infection among males (N=12) and females (N=15)**

| Variable         |               | Type of Infection |          | Total     | Chi-square (df) | P-value (Sig.) |
|------------------|---------------|-------------------|----------|-----------|-----------------|----------------|
|                  |               | E. gingivalis     | T. tenax |           |                 |                |
| Male Disorders   | Sinusitis     | 2 (22.2%)         | -        | 2 (16.7%) | 4.000 (3)       | 0.261 (NS)     |
|                  | Pharyngitis   | 3 (33.3%)         | -        | 3 (25%)   |                 |                |
|                  | Nasal allergy | 1 (11.1%)         | -        | 1 (8.3%)  |                 |                |
|                  | Gingivitis    | 3 (33.3%)         | 3 (100%) | 6 (50%)   |                 |                |
| Female Disorders | Sinusitis     | 2 (16.7%)         | -        | 2 (13.3%) | 3.281 (3)       | 0.350 (NS)     |
|                  | Pharyngitis   | 2 (25%)           | -        | 3 (20%)   |                 |                |
|                  | Nasal allergy | 2 (16.7%)         | -        | 2 (13.3%) |                 |                |
|                  | Gingivitis    | 5 (41.7%)         | 3 (100%) | 8 (53.3%) |                 |                |

**Table No. 5: Relationship between Gender and Amylase Level among parasitic infected (N=27) and non-infected (N=73) sample**

| Variable and Gender |         | Amylase Level |            | Total     | Chi-square (df) | P-value (Sig.) |
|---------------------|---------|---------------|------------|-----------|-----------------|----------------|
|                     |         | Normal Level  | High Level |           |                 |                |
| Infected            | Males   | 10 (83.33%)   | 2 (16.67%) | 12 (100%) | 1.741 (1)       | .187 (NS)      |
|                     | Females | 9 (60%)       | 6 (40%)    | 15 (100%) |                 |                |
| Uninfected          | Males   | 43 (100%)     | -          | 43 (100%) | N/A             |                |
|                     | Females | 30 (100%)     | -          | 30 (100%) |                 |                |

**Table No. 6: Relationship between disorder and malondialdehyde level among parasitic infected males (N=12), parasitic infected females (N=15), non-infected males (N=13), and non-infected females (N=9) sample**

| Disorder of Gender |               | Malondialdehyde levels (nMol/ml) |            | Total    | Chi-square (df) | P-value (Sig.) |
|--------------------|---------------|----------------------------------|------------|----------|-----------------|----------------|
|                    |               | Normal Level                     | High Level |          |                 |                |
| Males infected     | Sinusitis     | 1 (50%)                          | 1 (50%)    | 2 (100%) | 1.714 (3)       | .634 (NS)      |
|                    | Nasal allergy | -                                | 1 (100%)   | 1 (100%) |                 |                |
|                    | Pharyngitis   | 2 (33.33%)                       | 1 (66.67%) | 3 (100%) |                 |                |
|                    | Gingivitis    | 2 (33.33%)                       | 4 (66.57%) | 6 (100%) |                 |                |
| Females infected   | Sinusitis     | -                                | 2 (100%)   | 2 (100%) | 1.313 (3)       | .726 (NS)      |
|                    | Pharyngitis   | 1 (33.33%)                       | 2 (66.67%) | 3 (100%) |                 |                |
|                    | Nasal allergy | 1 (50%)                          | 1 (50%)    | 2 (100%) |                 |                |
|                    | Gingivitis    | 3 (37.50%)                       | 5 (62.50%) | 8 (100%) |                 |                |
| Males uninfected   | Sinusitis     | 3 (60%)                          | 2 (40%)    | 5 (100%) | 21.591 (3)      | <.0001 (HS)    |
|                    | Pharyngitis   | -                                | -          | -        |                 |                |
|                    | Nasal allergy | 4 (100%)                         | -          | 4 (100%) |                 |                |

|                       |               |         |         |          |            |          |
|-----------------------|---------------|---------|---------|----------|------------|----------|
|                       | Gingivitis    | 2 (50%) | 2 (50%) | 4 (100%) |            |          |
| Females<br>uninfected | Sinusitis     | 1 (50%) | 1 (50%) | 2 (100%) | 10.962 (3) | .012 (S) |
|                       | Pharyngitis   | 1 (50%) | 1 (50%) | 2 (100%) |            |          |
|                       | Nasal allergy | 3 (60%) | 2 (40%) | 5 (100%) |            |          |
|                       | Gingivitis    | -       | -       | -        |            |          |

Table 4 showed among males, sinusitis, 22.2% were recorded with *E. gingivalis* and none with *T. tenax*. For those with pharyngitis, 33.3% had *E. gingivalis* and none had *T. tenax*. One case of nasal allergy (11.1%) was associated with *E. gingivalis* infection only. In contrast, males with gingivitis showed the highest association, with 33.3% infected by *E. gingivalis* and 100% by *T. tenax*, no statistically significant. In females, sinusitis and nasal allergy, 16.7% in each group were observed with *E. gingivalis*, with no cases of *T. tenax* infection. For those with pharyngitis, 25% were showed with *E. gingivalis*, again with no *T. tenax* cases. Females with gingivitis showed 41.7% infected by *E. gingivalis* and 100% by *T. tenax*. Statistically no significant ( $P>0.05$ ) was difference.

Table 5 observed in the infected group, 16.67% of males exhibited high amylase levels compared to 40% of females, while 83.33% of males and 60% of females had normal amylase levels. no significant association. Table 6 showed in infected males 50% for both normal and high levels with sinusitis, 100% high levels with nasal allergy with no normal cases, 33.33% and 66.67% for both normal and high level of pharyngitis and gingivitis respectively. For infected females, this table observed 100 % for high level with sinusitis with no cases for normal level, 50 ,50 % normal and high level respectively with nasal allergy, 33.33% and 66.67% for both normal and high levels of pharyngitis and 37.50%,62.50% normal and high levels of gingivitis respectively. For males and females with parasitic infections, no significant associations were found ( $p > 0.05$ ), as seen with sinusitis, pharyngitis, nasal allergy, and gingivitis in both sexes.

## DISCUSSION

The mouth serves as the entry point between the outside world and the body, helping to maintain oral balance, safeguard the mouth, and prevent illness<sup>9</sup>.

This study observed the majority of participants were non-infected, while infections caused by *E. gingivalis* were reported in 21% of participants and *T. tenax* in 6%. The higher proportion of non-infected individuals suggests that the study sample is generally healthy. A study by Malaa et al<sup>8</sup> found a correlation between lower frequencies of oral parasites and higher education levels among individuals. However, the presence of infections, even in small proportions, among this healthy, educated population underscores the importance of continued research into oral and nasal pathogens.

This study focused on the staff and students of a nursing college, selecting this sample is necessary in order to increase their knowledge and awareness, due to their educational role regarding these diseases in society, the study of Al-Abbas et al<sup>10</sup> showed the role of the educational program in improving and enhancing nurses' knowledge about Trichomoniasis. However, the results of this study do not align with previous surveys conducted on patients attending dental departments in different provinces<sup>11</sup>. In our results the percentage of these oral parasites were higher than the results of Oladokun et al<sup>12</sup>. The higher rates of *E. gingivalis* in patients with periodontal gums compared to healthy not only indicates the presence of the disease but may also be connected to the severity of the condition and its tendency to worsen over time<sup>13</sup>.

The current study revealed no significant association in prevalence of *T. tenax* and *E. Gingivalis* among male and females. These results are similar to previous studies that found no gender differences in the incidence of *T. tenax* in individuals with periodontal disease<sup>14</sup>, and disagree with Gichki et al<sup>3</sup>, in contrast, incidence of *E. gingivalis* align with findings of Stensvold et al<sup>2</sup> and Oladokun et al<sup>12</sup>. The lack of a significant difference of age on the incidence of either *T. tenax* or *E. gingivalis* in the present study is similar to findings from previous studies<sup>2,12</sup>, and differ from those of Nuaimi<sup>14</sup>. While certain infections may appear to be more common in one gender, these differences often become insignificant when accounting for other factors, such as socio-economic status and access to healthcare<sup>15</sup>. This lower rate of *T. tenax* in both males and females in our study compared to some other studies may be due to the fact that *T. tenax* is more spread in individuals with poor oral hygiene and periodontitis, factors that were not established in our study.

The current study showed that different disorders were linked to varying rates of *E. gingivalis* infections in both males and females. The sample with gingivitis had a stronger association with *E. gingivalis* and *T. tenax*, with no significant association between sinusitis, nasal allergy, pharyngitis, and gingivitis. The findings of these two parasites in individuals with gingivitis align with other studies<sup>3,8,12,14</sup>. Other studies confirmed that *T. tenax* is documented to have a greater occurrence in periodontitis patients than gingivitis and other groups<sup>3,11</sup>.

In term of alpha-amylase levels, our findings showed in both male and female no significant difference. These results contrasting with those of Bharadwaj et al<sup>5</sup> and

Al-Nuaimi et al<sup>16</sup>. The significant increase in amylase levels observed in other studies compared to our finding, may be influenced by various factors. Increased alpha-amylase level has also been linked to greater severe periodontal disease, further signifying its possible as a biomarker for severity of periodontitis<sup>17</sup>.

## CONCLUSION

There is no significant difference between both infected males and females of various ages and the non-infected group in terms of oral parasite infections within the educated population. The health parameters did not show statistically significant results related to these infections.

### Author's Contribution:

|                                                                        |                                                        |
|------------------------------------------------------------------------|--------------------------------------------------------|
| Concept & Design or acquisition of analysis or interpretation of data: | Wijdan Dhaidan Shnain<br>Al-Abbas, Kawther<br>Alqaseer |
| Drafting or Revising Critically:                                       | Ohood Aqeed Radhi,<br>Nadia Habeeb Sarhan              |
| Final Approval of version:                                             | All the above authors                                  |
| Agreement to accountable for all aspects of work:                      | All the above authors                                  |

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