



Investigating the Spread of Oral Parasites Between University Students and Schools in Samarra City

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Article History	Abstract
Received: 06 May 2023 Revised: 05 August 2023 Accepted: 11 August 2023	<p>An investigation of oral parasites <i>Trichomonas tenax</i> and <i>Entamoeba gingivalis</i> was conducted from November 2021 to May 2022 in the parasite laboratory of the Faculty of Applied Sciences/Samarra University. Participants included Samarra University students as well as primary and middle school students for both sexes. 100 saliva samples, mouthwash water and gum swabs were examined for different age groups (10-40 years) using direct swabs and wet slide preparation. Study results indicate a total incidence of 57% for the <i>E. gingivalis</i> parasite and 1% for the <i>T. tenax</i>. <i>E. gingivalis</i>. Among females and males, the highest percentage was found in the males' age group (10-15) at 73.6%, whereas the females' age group (31-35) had the highest proportion at 100% for <i>Trichomonas</i>. A correlation was found between gingivitis and amoebiasis-oral alert at 22%, while those with healthy gums but suffering from dental decay were 78% with moral differences calculated at a probability level of ($p < 0.05$). As of the current study, oral parasite prevalence did not appear to be correlated with smoking, diabetes, the standard of living, or educational level.</p>
CC License CC-BY-NC-SA 4.0	Keywords: Oral parasites, Gingivitis, Oral Parasites

1. Introduction

Gingivitis is one of the most common diseases, affecting approximately 5-20% of the world's population (Maybodi et al., 2016). *Gingivitis* can be divided into two stages. The first stage is caused by bacteria, and this disorder can be solved by comprehensive dental protection. The second stage of *periodontitis* is known as inflammation of the supporting structures that are deeper than the tooth and are represented by the bone and the gum ligament. The cause of this inflammation is many microorganisms, such as parasites, motile bacteria, viruses, and fungi (Mosaddad et al., 2019) Along with other elements like genetics or environmental elements including smoking, diabetes, and interleukin-1 immunodeficiency (Ismail et al., 2016). Gram-negative bacteria constitute about 74% of *gingivitis* in addition to Gram-positive bacteria like *Streptococcus spp* (Mensch et al., 2019). 90% of the bacterial species causing chronic gum disease are anaerobic organisms. The signs of *gingivitis* include bleeding from gum crevices, particularly while brushing the teeth, and red, swollen gums that might also eventually result in tooth loss (Peres et al., 2019). *Trichomonas tenax* and *Entamoeba gingivalis* are two of the major parasites that induce *gingivitis*.

Due to the lack of studies on this subject in the city of Samarra, we decided to conduct this study to know the epidemiology of these two parasites and their effect on the tissues of the gums and teeth, and to identify ways to prevent and treat them.

2. Materials And Methods

Collect Samples

For the month of November 2020 through the month of February 2021, 100 samples of saliva and gum swabs were collected from both sexes for different age groups (10-40 years) from Samarra University students and some primary and middle schools for both sexes. In an effort to better understand the epidemiology of the oral parasites *E. gingivalis* and *T. tenax* in Samarra city, a sample was collected from patient populations who had gum disease, gingivitis, or who had their teeth removed who used an information form that also included the patient's name, age, sexual identity, and morbidity condition.

Examination Procedure:

Physical Examination:

This examination gets you ready by looking at the gums' color and texture, the tar tar layer (a greenish layer found in the gum tissue), the white surface covering the teeth's surface, and the level of dental decay (Carranza, 2002).

Microscopic examination: It is divided into:

Direct Smear Method: The gums of the mouth are directly sampled, as well as the area that becomes green when the gums are inflamed and the area near tooth decay if the gums are healthy. Following the addition of a drop of normal saline or an iodine stain mixture, the sample is fixed on the glass slide and inspected under a light microscope at both small and large powers (X40, X100) and the migration of the parasites was discovered 30 minutes after sample collection, and the samples were examined. (Luszczak et al., 2016).

Wet Preparation Method: A saliva-soaked sample from a patient with oral illnesses is placed on a clean, sterile glass slide, mixed completely with saliva, and covered in order to identify the oral parasites *E. gingivalis* and *T. tenax*. The slide is then inspected under a microscope using both a little and big force of magnification (X40, X100). In wet samples, the *T. tenax* parasite is wavy and mobile, and the front tuft can be identified by the hairs and undulations on the side membrane. If the parasite's specific traits are present in the sample, the results are good for (size, shape, nucleus shape, and number of hairs) (Luszczak et al., 2016).

The Method of Examining Saliva-Containing Mouthwash Water

The gargle containing the saliva of patients was placed in sterile tubes and placed in a centrifuge on a sedimentation force (3000 round for 5 minutes). The filtrate is neglected and the precipitate is taken and placed on a glass slide by adding a drop of iodine dye, placing the slide cover and examining it under the microscope with minor and major magnification powers of X40 and X100(8).

Statistic Assessment

The results were statistically evaluated using the statistical program (SPSS), and the Chi-Square test was used to see if there were any significant differences between the research groups (P 0.05) (9).

3. Results and Discussion

The Rate of Total Infection

Data were collected in the city of Samarra of the infection with oral parasites *E. gingivalis* and *T. tenax*, where it was found that the total infection rate with oral parasites was 58% shown in Table (1), distributed over 57% for *E. gingivalis* and 1% for *T. tenax* and these percentages are less than what was recorded by some researchers (Norberg et al., 2014; Al-Saeed and Mahmood, 2020), who recorded percentages ranging between 12-32 %. The present study's findings revealed that the rate of infection with *E. gingivalis* was 57% greater than the rate of infection with *T. tenax* parasite, which was 1%, which was consistent with several studies, such as the study (Al-Himyari et al., 2011), in which it was demonstrated that *E. gingivalis* infection rates were 31.37% greater than those of *T. tenax*, which were 22.53%, and in study (Sahar, 2013) it was found that the prevalence of *E. gingivalis* was 10%, while *T. tenax* was 2%.

The results of the total infection of the parasite *Entamoeba gingivalis* showed at a rate of 57%, and this percentage is in agreement with the previous study (Hammadi and Obaid, 2008) in Najaf, with an

infection average of 58.3%, and this percentage was higher than what was recorded in (Ibrahim and Abbas, 2012) in Baghdad, which amounted to 35%, and (Naimi, 2017) in Mosul, where it recorded 45.45%, and (Al-Buquerque et al., 2011) in Babel, it was 43%, and less than it recorded (Athari et al., 2007), where the infection reached 77%, as well as less than (Sarowska et al., 2004) in Iran, where it reached 66.7%. As for the presence of the *T. tenax* parasite, it was one infection with a rate of 1%, and it was similar to the study (Abualqomsaan et al., 2010), where it reached 2%, and with (Al-Saeed and Mahmood, 2020) in Baghdad, it reached 3%, and this percentage is considered very small compared to other studies, including (Alsaeed et al., 2019) in Egypt with a rate of 20%. In Saudi Arabia (Ismail et al., 2016), it amounted to 13%, while in Iran, the infection was 33.3% (Sarowska et al., 2004), and in Brazil it reached 51%, according to a study (Norberg et al., 2014), and despite the fact that these parasites are not pathogenic, but their presence is an indication of the health and safety of teeth (Al-Qassas, 2014). It was believed in previous studies that these parasites are not pathogenic, but recent studies indicate that the presence of these parasites is related to the poor oral environment as well as associated with the incidence of periodontal disease and bleeding gums (Al-Himyari et al., 2011).

The mouth parasites *E. gingivalis* with *T. tenax*, whose methods of transmission are similar in both, are indicators of poor oral hygiene, poor teeth care, and gum disease. This is done through kissing and spraying or the joint use of eating and drinking tools. The degree of personal hygiene and health culture in each place, the local environment, the total number of samples analyzed, the examination procedures, the examiner's precision, and skill, and the techniques employed during the examination may all be contributing factors to the difference in the percentage of infection between the current study and the studies mentioned above.

Table (1): Infection ratio of *Entamoeba gingivalis* with *Trichomonas tenax* parasites according to age in Samarra city.

Age	The suspected	<i>Entamoeba gingivalis</i>		<i>Trichomonas tenax</i>		The total	
		infected	%	infected	%	infected	%
10-15	34	24	70.5	0	0	24	70.5
20-16	19	9	47.3	0	0	9	47.3
25-21	19	9	47.3	1	5.2	10	5.2
30-26	15	9	60	0	0	9	60
31-35	4	3	75	0	0	3	75
36-40	9	3	33.3	0	0	3	33.3
Total	100	57	57	1	1	58	58

* Significant differences (p<0.05) between infections with the two parasites.

Epidemiology by Age

The current study showed the relationship of the age factor and its effect on the rate of oral parasite infection (Table 1), where the aged group's 75% greatest infection rate was (31-35) years for *E. gingivalis*, followed by the age of (10-15) years with a rate of 70.5%. for the parasite *T. tenax*, the infection was at the age of (21-25) by 5.2%, and These results were close to studies (Al-Saeed and Mahmood, 2020; Al-Qassas, 2014), where the highest infection was in the age group (21-30).

The reason may be due to the spread of parasites in young people because children have newly-grown teeth, usually milk teeth in the process of growth and formation, and they are vulnerable to infection, and the lack of awareness of the importance of oral hygiene, dental care and gums, and lack of interest in brushing the teeth and eating sweets in abundance and the lack of permanent care for the cleanliness of the teeth and gums, so parasites are infected. As for the high incidence of oral parasites in the age group 31 (35) years, the reason may be due to the large exposure to polluting factors such as smoking, alcohol and contaminated foods, which leads to providing an appropriate environment for infection with oral diseases, fungi and oral parasites.

Epidemiology by Gender

The results showed that the infection rate of males was 60%, which was higher than that of females by 37%. These results are in agreement with previous studies that confirm males are more infected than females, including the study by *Al-Saeed and Mahmood (2020)* in Babylon, the study by *Al-Qassas (2014)* in Nigeria, the study by *Al-Mashhadani et al. (2007)* in Kirkuk, the study by *Al-Sultani and Al-*

Quraishi (2014) in Baghdad, and the study by *Onyido et al. (2011)* in Nigeria. However, these findings disagree with the study by *Hammadi and Obaid (2008)* in Kirkuk city, the study by *Al-Masoudi et al. (2009)* in Karbala, and the study by *Khan (2008)*, as they did not find a relationship between gender and infection (Table 2). Perhaps the reason for the decrease in the infection rate in females is due to health awareness and the great care of the mouth and teeth as factors of hygiene and elegance. Females often have more time, comfort, and are more likely to be at home compared to males. Additionally, females generally have stronger immune systems against many diseases compared to men (*Khan, 2008*). It's worth noting that the frequent exposure of males to factors such as smoking, contaminated food, and alcohol due to their prolonged outdoor presence may provide a suitable environment for infection with the gingival amoeba parasite, which is in agreement with *Al-Saeed and Mahmood (2020)*.

The study also showed that age plays a role in infection. Among males, the highest percentage of infection was observed in the age group of 10-15 years, at 73.6%, while the lowest percentage was in the age group of 36-40 years, at 33.3%. These findings did not agree with the study by *Al-Himyari et al. (2011)*, where the highest infection rate was observed in individuals aged 20 years. Among females, the highest infection rate was in the age group of 30-35 years, at 100%, while the lowest was in the age group of 36-40 years, at 33.3%. It was found that the incidence of infection increases with age.

Regarding the *T. tenax* parasite, as shown in Table (3), it was found that the infection occurred in the age group of 21-25 years, with a rate of 10%. These results agreed with the studies by *Al-Qassas (2014)* and *Khan (2008)* about the presence of the parasite in women only.

Table (2): *Entamoeba gingivalis* infection rates by sex.

Age	female			Male			The total		
	suspected	infected	%	Suspected	infected	%	Suspected	Infected	%
15-10	19	14	73.6	15	10	66.6	34	24	70.5
20-16	8	4	50	11	5	45.4	19	9	47.3
25-21	9	5	55.5	10	4	40	19	9	47.3
30-26	6	4	66.6	9	5	55.5	15	9	60
-3135	2	1	50	2	2	100	4	3	75
36-40	6	2	33.3	3	1	33.3	9	3	33.3
Total	50	30	60	50	27	34	100	57	57

* There are significant differences at ($p < 0.05$) between male and female infection.

Table (3): *Trichomonas tenax* infection rates by gender

Age	female			Male			The total		
	suspected	infected	%	Suspected	infected	%	suspected	Infected	%
15-10	19	0	0	15	0	0	34	0	0
20-16	8	0	0	11	0	0	19	0	0
25-21	9	0	0	10	1	10	19	1	5.2
30-26	6	0	0	9	0	0	15	0	0
-3135	2	0	0	2	0	0	4	0	0
36-40	6	0	0	3	0	0	9	0	0
Total	50	0	0	50	1	2	100	1	1

There are none -significant differences at ($p < 0.05$).

Diseases Associated with Infection

The results displayed that 22% of the oral amoeba were for those with gingivitis, while people with healthy gums but suffered from tooth decay reached 78%, as shown in Table (4). These results agreed with *Abualqomsaan et al. (2010)* about the dispersal of the parasite *Entamoeba gingivalis* more than *Trichomonas tenax* in people with dental problems, it agreed with *Al-Sultani and Al-Quraishi (2014)*, where they form a direct connection between gingivitis and the found of the parasite *Entamoeba gingivalis*, but it did not agree with *Nocito and Vasconi (2003)*, where the infection in people with infected gums reached 81.4%, while healthy gums amounted to 62.5%, the outcome of the present

study matched with a treatise *Younis and Elamami (2019)* in Libya, *Hamad et al. (2012)* in Mosul, *Norberg et al. (2014)* in Najaf, *Ghabanchi et al. (2010)* in Poland, *Al-Himyari et al. (2009)* in Babylon, *Kadir and AL-Mashhadani (2007)* in Najaf.

Table (4): Symptoms associated with oral parasite infection.

Age	Suspected number	Gingivitis infected	%	tooth decay infected	%
15-10	34	6	17.6	28	82.3
20-16	19	5	26.3	14	73.6
25-21	19	3	15.7	16	84.2
30-26	15	2	13.3	13	86.6
-3135	4	2	50	2	50
36-40	9	4	44.4	5	55.5
Total	100	22	22	78	78

* There are significant differences at ($p < 0.05$)

According to multiple studies, oral parasites spread more easily when the mouth is in poor condition, including *E. gingivalis* which is increased by the presence of calcification, loss of connective tissue, loss of connective fibers, and poor oral hygiene (*Onyido et al., 2011; Ozumba et al., 2004*).

The Place of Sample:

The examined samples were direct swabs from the mouth in addition to saliva. The study showed that the parasite appears in saliva as well. These results were in agreement with *Al-Saeed and Mahmood (2020)*, while they did not agree with *Trim et al. (2011)*, as it was shown that there is no relationship between saliva and parasites, and the results showed that the parasite can be obtained from the direct swab of the gums, this is agreed with *Al-Saeed and Mahmood (2020)*, while it did not agree with *Nocito and Vasconi (2003)*, as they found that the parasite is located 4-7 mm deep inside the gums. This result was also confirmed by the researcher *Ibrahim and Abbas (2012)*, and the reason may be due to differences in procedures or laboratory tests.

Correlation of the Parasite with Other Factors

Some studies showed that the parasite's association with other diseases such as diabetes, high blood pressure, and smoking, and this did not appear in our results, because those infected with oral parasites did not suffer from other diseases, and these results were in agreement with *Trim et al. (2011)* while they did not agree with *Al-Tai (2020)*. As for the level of education, our results did not show any relation between the level of learning and the presence of the parasite, because the samples collected from students at different levels of study, and this indicates that there is no relationship between the parasite and the academic level, and it agreed with *Ghabanchi et al. (2010)*, while the researcher *Kadir and AL-Mashhadani (2007)* showed that there is a direct correlation between low levels of education and parasite presence.

4. Conclusion

No Conclusion

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