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Editorial

We start this pioneering work, which do not seek perfection as much as aiming to provide a scientific window that opens a wide area for all the distinctive pens, both in the University of Sabratha or in other universities and research centers. This emerging scientific journal seeks to be a strong link to publish and disseminate the contributions of researchers and specialists in the fields of applied science from the results of their scientific research, to find their way to every interested reader, to share ideas, and to refine the hidden scientific talent, which is rich in educational institutions. No wonder that science is found only to be disseminated, to be heard, to be understood clearly in every time and place, and to extend the benefits of its applications to all, which is the main role of the University and its scholars and specialists. In this regard, the idea of issuing this scientific journal was the publication of the results of scientific research in the fields of applied science from medicine, engineering and basic sciences, and to be another building block of Sabratha University, which is distinguished among its peers from the old universities.

As the first issue of this journal, which is marked by the Journal of Applied Science, the editorial board considered it to be distinguished in content, format, text and appearance, in a manner worthy of all the level of its distinguished authors and readers.

In conclusion, we would like to thank all those who contributed to bring out this effort to the public. Those who lit a candle in the way of science which is paved by humans since the dawn of creation with their ambitions, sacrifices and struggle in order to reach the truth transmitted by God in the universe. Hence, no other means for the humankind to reach any goals except through research, inquiry, reasoning and comparison.

Editorial Committee

Notice

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Publication instructions

The journal publishes high quality original researches in the fields of Pure Science, Engineering and Medicine. The papers can be submitted in English or Arabic language through the Journal email (jas@sabu.edu.ly) or CD. The article field should be specified and should not exceed 15 pages in single column.

All submitted research manuscripts must follow the following pattern:

- Title, max. 120 characters.
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- Abstract, max. 200 words.
- Keywords, max. 5 words.
- Introduction.
- Methodology.
- Results and Discussion.
- Conclusion.
- Acknowledgments (optional).
- References.

Writing Instructions:

Papers are to be submitted in A4 (200×285 mm) with margins of 25 mm all sides except the left side, which should be 30 mm. Line spacing, should also be 1.15.

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Invitation

The Editorial Committee invites all researchers "Lectures, Students, Engineers at Industrial Fields" to submit their research work to be published in the Journal. The main fields targeted by the Journal are:

- Basic Science.
- Medical Science & Technology.
- Engineering.

Refereeing

The Editorial Committee delivers researches to two specialized referees, in case of different opinions of arbitrators the research will be delivered to a third referee.

Editorial Committee

CONTENTS

PREVALENCE OF TRICHOMONAS TENAX IN PATIENTS WITH PERIODONTAL DISEASE IN SURMAN CITY

Saleha Alarabi Algusbi[1*], Mbaruk Ahmed Almagdoush[2], Ghofran Abdul Almajeed Alarbi[3], Hajer Noury Saqer[4], Manal Abdul Alwahed Alghunnoudi[5], and Mohammed Saleh Alkayakh[6]

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Abstract

Trichomonas tenax is a flagellated protozoan commonly found in the human oral cavity, particularly between the teeth, gums, tongue, and in the saliva of individuals with poor oral hygiene. While *T. tenax* infections outside the oral cavity are rare, they are possible. It is known to be the causative agent of necrotizing ulcerative gingivitis and necrotizing ulcerative periodontitis.

The study was conducted to determine the prevalence of *T. tenax* among patients with periodontal disease in Surman City and to investigate the correlation between the presence of the protozoan and factors such as age, gender, oral hygiene, and dental health. This cross-sectional study was carried out between April 2023 and June 2023 at Al-Ain Dental Center, Al-Massara Dental Clinic, and Surman Al-Kubra Dental Clinic. A total of 100 participants were included, comprising 12 males and 88 females, with ages ranging from 6 to 89 years. The prevalence of *T. tenax* infection was found to be 40%, with females (88%) being more likely to be infected than males (12%). The highest prevalence was observed in individuals aged 20 to 39. The study concluded that *T. tenax* is more prevalent in patients with periodontal disease, as 48% of those tested were found to be infected. Understanding the risk factors associated with *T. tenax* infections can aid in reducing and preventing these infections. The findings underscore the need for public health education to raise awareness about *T. tenax* and its impact on oral health.

Keywords: *Trichomonas tenax* (*T. tenax*); Oral cavity; Flagellated protozoan; Necrotizing ulcerative gingivitis; Necrotizing ulcerative periodontitis.

Introduction

Trichomonas tenax is a species of *Trichomonas* frequently found in the human oral cavity, particularly in association with periodontal infections. It is generally absent in healthy patients with good oral hygiene (Lyons et al., 1980). The protozoan is most commonly located in gingival crevices, periodontal pockets, and dental plaque. The

prevalence of *T. tenax* varies across populations, with higher rates observed among individuals with periodontal disease and poor dental hygiene (Momeni et al., 2019).

The parasite is transmitted through direct contact, shared objects, and oral sex (Momeni et al., 2018). Both men and women are susceptible to *T. tenax* infections, which may present with symptoms such as halitosis, inflamed gums, and canker sores.

T. tenax colonizes the oral cavity by forming biofilms using surface proteins that bind to host cells and elements of the extracellular matrix. These biofilms protect the parasite from host defenses and enable its persistence in the oral cavity. The parasite also exhibits mechanisms to evade the host immune system. It can alter surface proteins to avoid detection by host antibodies and produce proteases that degrade host immunoglobulins and complement proteins.

Furthermore, *T. tenax* develops virulence factors that enhance its pathogenicity. These include enzymes like cysteine proteinases, which can damage host tissues and contribute to periodontal disease (Dybicz et al., 2018).

Microscopic examination of dental plaque or saliva samples can be used to diagnose *Trichomonas tenax* infection. Under a microscope, the parasite appears as elongated, flagellated organisms that exhibit rapid movement in wet mounts. In addition to microscopic methods, molecular techniques like polymerase chain reaction (PCR) can also be employed for diagnosis. PCR offers a more accurate and specific approach by detecting parasite DNA in dental plaque or saliva samples (El-Sayed and Méabed, 2008; Athari et al., 2007).

Treatment of *T. tenax* infections generally involves improving dental hygiene practices and addressing any underlying periodontal disease. In severe cases, antimicrobial drugs such as metronidazole may be prescribed (Mehlhorn, 2015).

Preventative measures include maintaining good oral hygiene habits, avoiding the sharing of personal items, attending routine dental checkups, using antiseptic mouthwash, and refraining from smoking. By following these preventive steps, individuals can reduce their risk of oral infections caused by *T. tenax* (Otter et al., 2013).

There is limited research on the prevalence and impact of *T. tenax* in Libya. However, a study conducted in 2018 found a prevalence rate of 21% in dental plaque samples from Libyan patients. Additionally, the study revealed that patients with *T. tenax* had higher incidences of dental caries and periodontitis compared to those without the parasite (Kurnatowska and Kurnatowski, 2015).

The aim of this study was to investigate the prevalence of *Trichomonas tenax* among periodontal patients and to explore correlations between the presence of the parasite and factors such as age, gender, oral hygiene, and dental health in Surman, Libya.

Methodology

The study was conducted at Al-Ain Dental Center, Al-Massara Dental Clinic, and Surman Al-Kubra Dental Clinic in Surman City. A total of 100 samples were collected, consisting of 12 male and 88 female participants aged between 6 and 89 years. The participants were from various cities in western Libya. This cross-sectional study was carried out between April and June 2023.

1 Sample Collection:

Saliva and dental biofilm samples were collected from patients in the morning. Dental biofilm/calculi samples were obtained using sterile periodontal curettes to scrape the frontal mandibular region, which was most impacted by periodontal disease.

2 Sample Preparation:

The samples were placed on sterile cotton swabs and diluted with normal saline on a clean glass slide at room temperature (25 to 28 °C). After dilution, a coverslip was placed over the sample, which was immediately examined under a light microscope.

3 Data Entry and Analysis:

Data were collected and analyzed quantitatively and qualitatively. Quantitative variables were expressed as mean ± standard deviation (± s.d.) and range, while qualitative variables were presented as frequencies and percentages.

Results

A total of 100 participants, aged 6 to 89 years, were included in this study. The results revealed that 20% of participants were under 20 years old, 44% were aged between 20-39 years, 22% were aged between 40-59 years, 10% were aged between 60-79 years, and 4% were over 80 years old Table (1). The majority of infected patients were in the 20-39 age group Figure (1).

Among the participants, 88% were female and 12% were male Table (2). Most of the infected individuals were female, as shown in Figure (2).

The study also found that 84% of participants had poor oral hygiene, while 16% had good oral hygiene Table (3). The majority of infections occurred in individuals with poor oral hygiene Figure (3).

Regarding oral health status and the presence of dental disease, 52% of participants were classified as unhealthy, while 48% were considered healthy Table (4). Most infection cases were observed in unhealthy individuals Figure (4).

Table (1): Distributed Sample Based on Age Groups.

Age groups	Frequency	Percent %
Less than 20 years	20	20%
20-39 years	44	44%
40-59 years	22	22%
60-79 years	10	10%
More than 80 years	4	4%
Total	**100**	**100%**

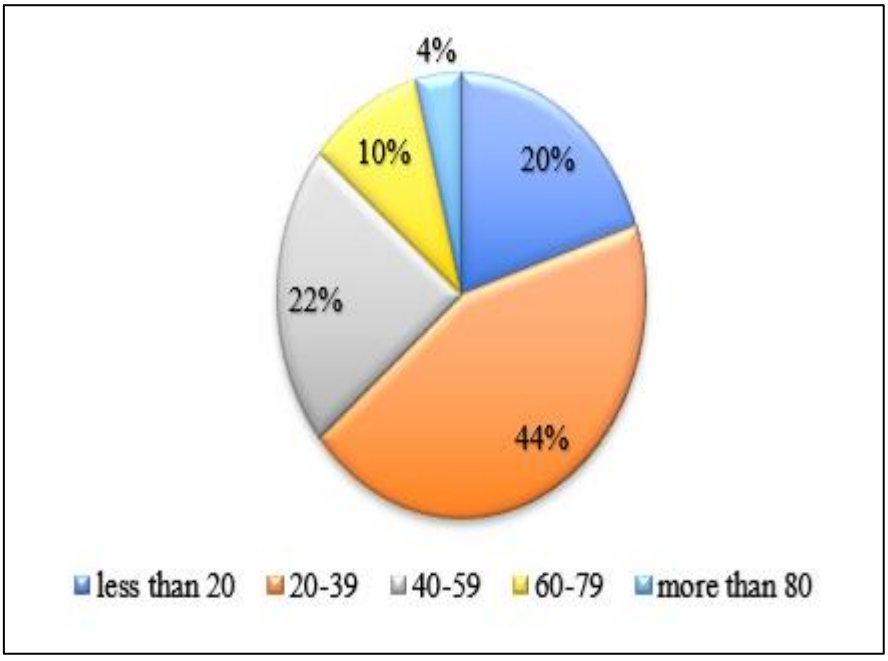

Figure (1): Frequency of Age Groups.

Table 2: Distributed Sample Based on Gender.

Gender	Frequency	Percent %
Male	12	12%
Female	88	88%
Total	**100**	**100%**

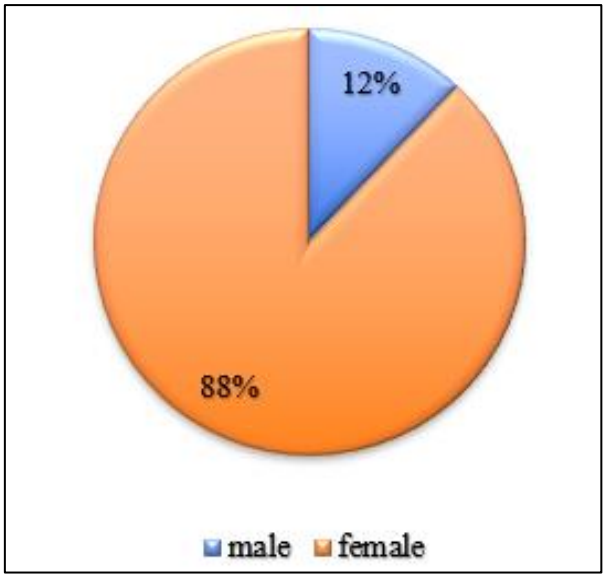

Figure (2): Frequency of Gender.

Table (3): Distributed Sample Based on Oral Hygiene.

Oral hygiene	Frequency	Percent %
Bad	84	84%
Good	16	16%
Total	**100**	**100%**

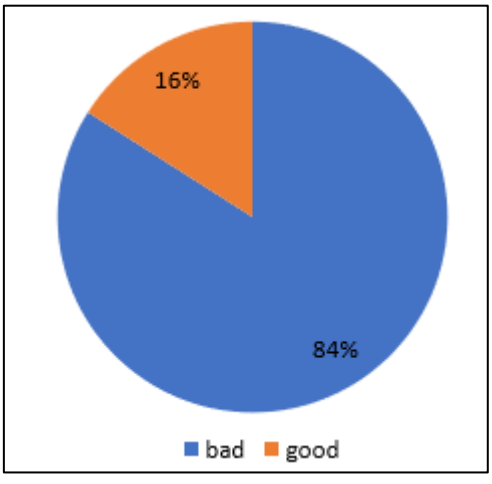

Figure (3): Frequency of Oral Hygiene.

Table (4): Distributed Sample Based on Oral Health and Presence of Dental Diseases.

Oral health	Frequency	Percent %
Healthy	48	48%
Unhealthy	52	52%
Total	**100**	**100%**

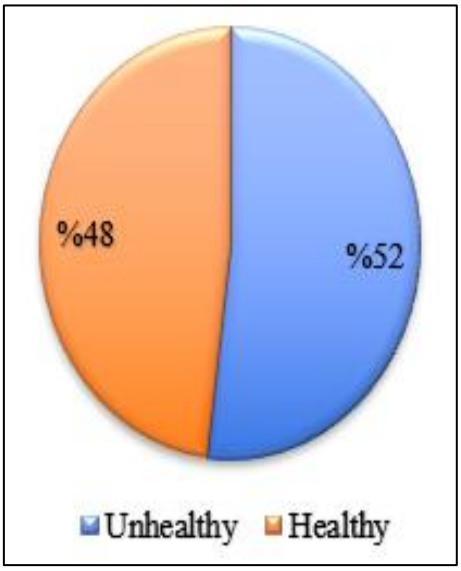

Figure 4: Frequency of Oral Health and Presence of Dental Diseases.

Discussion

The human oral cavity is frequently inhabited by the protozoan parasite *Trichomonas tenax*, most commonly located in gingival crevices, periodontal pockets, and tooth plaque. The prevalence of *T. tenax* varies across populations, with higher rates observed in individuals with poor dental hygiene and weakened immune systems. This study aimed to determine the prevalence of *T. tenax* and explore correlations with age, gender, oral hygiene, and dental health.

The study revealed that the highest infection rate (44%) occurred among individuals aged 20 to 39 years. This aligns with findings by Nelson et al. (2023), which demonstrated an age-related increase in *T. tenax* prevalence. Factors contributing to this trend may include reduced salivary flow, decreased tooth brushing, increased dental plaque, and exposure to other oral pathogens. Additionally, weakened immune systems and habits such as smoking may create conditions conducive to *T. tenax* growth in this age group (Kumar et al., 2017).

The rate of infection among females (88%) was notably higher than males (12%). This observation is consistent with findings by Smith et al. (2015). Potential explanations include differences in oral hygiene practices, hormonal changes affecting immune response, and the possibility of sexual transmission of *T. tenax* (Al-Azzawi et al., 2022).

The study also found that individuals with poor oral hygiene (84%) were more frequently infected than those with good oral hygiene (16%). Poor oral hygiene may create an environment favorable to *T. tenax* growth, as well as increase the risk of transmission through shared toothbrushes, cups, or utensils (Khan et al., 2019).

Finally, a higher prevalence of *T. tenax* was observed in individuals with dental disease (52%) compared to those without (48%). This result aligns with the findings of Pihlstrom et al. (2005), which suggest that dental diseases can damage oral tissues, weaken immune defenses, and increase susceptibility to infection (Khan et al., 2019).

This study highlights the associations between *T. tenax* prevalence and various demographic and health factors, emphasizing the need for targeted interventions to improve oral hygiene and dental health to reduce infection rates.

Conclusion

We conclude that *Trichomonas tenax* is a flagellated protozoan commonly found in the human oral cavity. The parasite is associated with poor oral hygiene and periodontal infections, and in rare cases, it can cause respiratory symptoms and exacerbate pre-existing lung problems. The prevalence of *Trichomonas tenax* varies among different populations, with higher rates observed in people with gum problems and poor oral hygiene. It provides information on the prevalence, transmission, and diagnosis of *Trichomonas tenax*. Prevention strategies include maintaining good oral hygiene, avoiding the sharing of personal items, undergoing regular dental check-ups, using antimicrobial mouthwash, and refraining from smoking.

Further studies are recommended to determine the prevalence of *Trichomonas tenax* amongst other factors such as smoking and chronic diseases (diabetes milletus) and its relationship with gender, age, and oral hygiene, and further investigations using modern and more sensitive techniques such as PCR are needed. In addition, the study highlights the need for public health education to increase knowledge of *T. tenax* infection.

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Dental Clinic, and Surman Al-Kubra Dental Clinic for their cooperation and support throughout the study.

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