



# Frequency of Trichomoniasis and Related Risk Factors in the Women Referred to Bandar Abbas Health Centers, Iran, 2017-2018

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## Abstract

**Background:** *Trichomonas vaginalis* is one of the most important parasites transmitted through sexual contact. Therefore, it is considered a major public health problem. Best to our knowledge, there are no new reports about the prevalence of *T. vaginalis* in Bandar Abbas.

**Objectives:** The present study aimed to determine the frequency of *T. vaginalis* in women referred to the urban and rural health centers of Bandar Abbas, Iran. In addition, other risk factors associated with this parasite were investigated.

**Methods:** This descriptive cross-sectional study was conducted between October 2017 and June 2018. Five hundred samples obtained from vaginal discharges or fluid were examined using wet mount and culture in Diamond medium. Moreover, the demographic data and related risk factors were gathered as a questionnaire. To analyze the data, SPSS ver. 20 was used and the statistical tests of chi-square and Fisher's exact were applied.

**Results:** In this study, *T. vaginalis* was detected in 13 (2.6%) out of 500 samples of the vaginal discharges or fluids in which 12 (2.4%) were detected by wet mount and 13 (2.6%) by culture method, respectively. A significant difference was observed between the incidence of the parasite and place of residence, the level of education, and abortion.

**Conclusions:** The relatively low parasite outbreak in the studied samples is likely as a result of continuous monitoring and appropriate treatment.

**Keywords:** *Trichomonas vaginalis*, Frequency, Bandar Abbas, Iran

## 1. Background

*Trichomonas vaginalis* is one of the most important parasites transmitted through sexual contact (1, 2). It also increases the risk of human immunodeficiency virus (HIV) transmission possibly as a result of the local inflammation often caused by the parasite (3, 4). Consistent with the numerous studies in the world, the prevalence of *T. vaginalis* differs among different geographical regions, communities, cultures, and religions. The multiple sexual partnerships and individual health of the people's genital organs are related to the parasite transmission (5). The prevalence of *T. vaginalis* in women differs in different populations, where it is ten times higher than men. The infection comprises the risks of premature delivery birth, low birth weight, infertility, and cervical cancer (6, 7). Clinical manifestations of the parasite are different in men and

women. Women sometimes have no clinical symptoms; however, they occasionally present severe clinical manifestations such as burning, pruritus, and leukorrheal secretions. Men are most often without clinical symptoms, but they have the role of parasite carriers for women (8). Trichomoniasis seems to be a common sexually transmitted disease in Iran. The prevalence of the parasite in Iran varied from 0.4% to 42% from 1992 to 2017 (9). In a systematic review in Iran, the average infection rate of trichomoniasis was 8%. While the highest rate was in the central provinces of Iran (15.3%), especially in Tehran, and the least in the eastern provinces (10). According to our information, there are no new reports about the prevalence of *T. vaginalis* in Bandar Abbas.

## 2. Objectives

The present study aimed to determine the frequency of *T. vaginalis* in women referred to 16 urban and rural health centers. In addition, other risk factors associated with this parasite were also investigated.

## 3. Methods

### 3.1. Study Site and Study Population

This descriptive cross-sectional study was conducted between October 2017 and June 2018. The estimated sample size was calculated based on the sample size formula for a restricted population; the population of women ( $N = 240,000$ ), the expected prevalence of 2.8% (11),  $\alpha = 0.05$ ,  $\beta = 0.2$ , and  $d = 0.007$ . The minimum necessary sample was estimated as 500 women. All of the women who referred to the health care centers for periodic monitoring and treatment were included, and the women who had taken antibiotics in the last two weeks were excluded. Five hundred samples of the vaginal discharges or fluid were obtained from women in health centers of Bandar Abbas and the suburbs, Iran. Bandar Abbas city with a population of more than 500,000 people is located in the south of Iran; a tropical region, attached to the Persian Gulf with high humidity (20% - 100%), and warm climate (12).

### 3.2. Data Collection and Questionnaire

Two swabs of women's vaginal discharge or vaginal fluid were obtained with the assistance of an experienced midwife. The first swab was placed in a test tube containing sterile normal saline and the second in a Diamond culture medium (QUELAB, Canada) (13). In addition, vaginal pH was measured by moistening a pH paper with vaginal fluid obtained from the lateral vaginal wall. We immediately evaluated the wet mount prepared specimens and the tubes containing culture media were subsequently transferred to the parasitology laboratory of the faculty of medicine, Hormozgan University of Medical Sciences, Bandar Abbas and placed in an incubator with 37°C where it was examined after 24 hours and followed up daily for a week. Following the examination of the culture medium using a light microscope, one drop placed on glass slides, fixed by methanol, then stained by Giemsa, and examined using a light microscope at 100X magnification (14).

A questionnaire was prepared regarding demographic characteristics of the participants and risk factors, including age, level of education, occupation, residency (urban or rural), marriage counts, number of partners, abortion, pH of the vagina, and contraceptive method.

### 3.3. Statistical Analysis

To analyze the results of the tests and the data obtained from the questionnaire, SPSS V. 20 (Chicago, IL, USA) was used and the statistical tests of chi-square and Fisher's exact were applied. A p-value of less than 0.05 was considered statistically significant.

### 3.4. Ethical Approval

The study was approved by the Infectious and Tropical Diseases Research Center, Hormozgan Health Institute, Hormozgan University of Medical Sciences, Bandar Abbas, Iran, with the Code of Ethics, HUMS.REC.1396.66. The objectives of the study and the procedures were explained to all of the participants and then written informed consents were obtained.

## 4. Results

*T. vaginalis* was detected in 13 (2.6%) out of 500 samples of the vaginal discharge or fluids in which 12 (2.4%) by wet mount and 13 (2.6%) by culture method, respectively. A significant difference was seen between the incidence of the parasite and the place of the residence, the level of education, and abortion. The demographic characteristics and the risk factors of the participants are shown in Tables 1 and 2, respectively.

## 5. Discussion

The frequency of *T. vaginalis* in this population was 2.6%. This frequency is lower than the anticipated outbreak of the parasite in the world (5%) (15); however, this parasite is less than our finding in the south of Tehran (0.41%), the capital of Iran (7), which is probably associated with the economic, personal hygienic education, and social factors. It is consistent with the prevalence of this parasite in Kashan (2%) (8). The prevalence of this parasite in women referred to the public and private Clinics of Hamedan's Obstetrics and Gynecology was (2.1%) (16), which is consistent with the findings of our study, but not consistent with the study of Bahram et al. (17) in Zanjan was 6.6%. Many factors affect the frequency of trichomoniasis, including older age, sexual activity, number of sexual partners, coinfection with other sexually transmitted diseases (STDs), phase of the menstrual cycle, methods of diagnosis, and socioeconomic status (2), and also culture, religious beliefs, people's literacy rate, economic welfare, and health (10). The frequency of this parasite in the study of Nourian et al. in Zanjan in pregnant women was 3.3% (18). Other studies

**Table 1.** Frequency of *Trichomonas vaginalis* Based on Demographic Characteristics in 500 Women<sup>a</sup>

Variables	Frequency	Trichomoniasis Positive	K <sup>2</sup>	P Value
<b>Age group</b>			1	0.61
< 35 year	193 (38.6)	5 (2.6)		
> 35 year	307 (61.4)	8 (2.6)		
<b>Educational level</b>			1	0.017
< Diploma	263 (52.6)	11 (4.2)		
Diploma or > Diploma	237 (47.4)	2 (0.8)		
<b>Occupation</b>			1	0.523
Housewife	476 (95.2)	13 (2.7)		
Employee	24 (4.8)	0 (0)		
<b>Residency</b>			1	0.008
Urban	347 (69.4)	13 (3.7)		
Rural	153 (30.6)	0 (0)		

<sup>a</sup>Values are expressed as No. (%).

are comprised of the results related to the women attending STD clinics in Tehran (4) 3.2%, woman of Ardabil (19), northwest of Iran (4.48%) and women referred to Gynecology Clinic in south-east of Iran (Chabahar) 9.75% (20). They were all higher than the frequency of this parasite in Bandar Abbas. However, in some parts of the world, the prevalence of this parasite is considerably different e.g. Iceland (21) and Poland (22), where no positive samples were found among the participants. In those women attending nine STD clinics in the USA (23), the prevalence rate was 14.6%, in the women of reproductive age in Brazil 16% (14), in women who suffered from problems in the genitourinary system in the south of Iraq was more than 50% (24). Trichomoniasis among pregnant women referring to two hospitals in Ghana was 20.2% (5) and among women treated at a university hospital in southern Brazil was 4.1% (2).

In the present study, there was a significant difference between the incidence of the parasite and the place of residence, the level of education, and abortion.

Trichomoniasis in rural areas was significantly different from that of urban areas because all of our positive samples were from the urban area. Of course, the interpretation of this result is difficult, but it can be as a result of ethical issues in rural areas, as well as the small countryside, and the familiarity of the whole villagers. This study, contrary to the information obtained in the villages of Iraq, shows that the frequency of the parasite in the villages is very high (24), but is similar to study of Nourian et al. in Zanjan (18).

In the present study, there was a significant relationship between abortion and trichomoniasis, which is sim-

ilar to that of Habibi et al. in Qom (25), but on the contrary to the study of Azambakhtiar et al. (7) in Tehran. Spontaneous abortion could be one of the complications of trichomoniasis (26). The change in the microbial flora of the vagina and probably accompanied by other STDs can increase the risk of abortion (27) that were not studied in this paper. Confirmation of trichomoniasis and the risk of abortion should be investigated with a more appropriate design.

The level of the participants' literacy had a positive effect on trichomoniasis infection. Most of the positive parasitic cases were in uneducated and under-diploma attendants, which is in agreement with the study of Matini et al. in Hamadan (16) or Jarallah in south Iraq (24). Indeed, literacy has a significant impact on their awareness of health issues.

Although the comparison of diagnostic methods were not the objectives of the study, due to the importance of the subject, we evaluated this issue as well. Several diagnostic methods have been developed to detect *T. vaginalis* (13, 28). The most cost-effective method for detecting this parasite is the direct method and observing the discharge in the wet samples (29). The direct method does not have enough sensitivity to detect a parasite, it requires several prerequisites such as the skill of the person and the amount of time spent for observation, as well as the interval of the sampling and observation of the slides (18). In this study, we used two methods of diagnosis, including wet mount and culture. Using the wet mount, the frequency of parasites was 2.4% and by culture in Diamond medium, 2.6%. No significant difference was found between the direct and

**Table 2.** Frequency of *Trichomonas vaginalis* Based on Risk Factors in 500 Women<sup>a</sup>

Variables	Frequency	Trichomoniasis Positive	K <sup>2</sup>	P Value
<b>Marriage counts</b>			1	0.068
One	437 (87.4)	9 (2.1)		
> One	63 (12.6)	4 (6.3)		
<b>Abortion</b>			3	0.023
None	374 (74.8)	7 (1.9)		
One	85 (17)	2 (2.4)		
Two	24 (4.8)	(8.3)		
3 and > 3	17 (3.4)	2 (11.8)		
<b>Number of partners</b>			1	0.726
> One	12 (23.4)	0 (0)		
One	488 (97.6)	13 (2.7)		
<b>Contraceptive method</b>			4	0.878
None	273 (54.6)	6 (2.2)		
Condom	77 (15.4)	3 (3.9)		
Tab or Injection	109 (21.8)	3 (2.8)		
Tubectomy or vasectomy	27 (5.4)	1 (3.7)		
IUD	14 (2.8)	0 (0)		
<b>Vaginal pH</b>			1	0.072
4	126 (25.2)	1 (0.8)		
5	185 (37)	4 (2.2)		
6	152 (30.4)	8 (5.3)		
7	37 (7.4)	0 (0)		
<b>Symptoms of trichomoniasis</b>			1	0.537
Yes	368 (73.6)	10 (2.7)		
No	132 (26.4)	3 (2.3)		

<sup>a</sup>Values are expressed as No. (%).

culture methods in the studied samples, which is inconsistent with the study of Manshoori et al. in Rafsanjan (30). It seems the culture method is more susceptible than the wet mount (8, 16, 19). The benefits of applying these two methods at the same time were a quick response to the test allowing the patient to start the treatment easily. The culture method was known as the standard method for the diagnosis of *T. vaginalis* prior to the molecular methods (28). The culture method is not commonly used in laboratories because it is both time-consuming and suitable condition-dependent such as the culture medium sensitivity, the storage time and fast transmission of the parasite to the appropriate medium after sampling are needed.

We expected to observe more trichomoniasis in the women of under 35 who are more sexually active. In contrast, women over the age of 35 had more sexual inter-

courses, which increases the chance of having a parasite. In the present study, there was no significant difference in the age of the participants and trichomoniasis, which contradicts the study of Nourian et al. in Zanjan (18).

There was no significant difference in the clinical symptoms of trichomoniasis in detecting the parasite such as the study of Habibi et al. in Qom and it is inconsistent with the study of Manshoori et al. in Rafsanjan (30). Three of the participants who were positive for trichomoniasis did not have any trichomoniasis clinical symptoms. Therefore, in the treatment of patients, it should not emphasize clinical symptoms solely. Obviously, asymptomatic people as carriers have a significant role in the transmission of the parasite. Hence, to accelerate the treatment and reduce the spread of disease, it is necessary to identify them, which can be done through specific tests.

Another factor that contributes to trichomoniasis is the increase in the vaginal pH. In this study, the highest frequency of trichomoniasis was seen in pH = 6. This increase of pH can facilitate the growth and colonization of the protozoan (2). However, no significant difference was found between pH and trichomoniasis.

The frequency of marriage, as well as the number of sexual partners in trichomoniasis, did not show any significant difference in contrast to the study of Oyeyemi et al. in Nigeria (31). Of course, the number of those with such characteristics was low compared to the rest of the participants. As a result, an accurate interpretation of the results is not possible.

Although all positive cases were seen in housewives, there was no significant relationship between trichomoniasis and women's occupation, which may be as a consequence of the low number (4.8%) of employed women. This study is similar to the study of Nourian et al. in Zanjan (18) and Oyeyemi et al. in Nigeria (31).

One of the limitations of the study was the lack of cooperation and the satisfaction of some patients with sampling, which resulted in the sample collection with a prolonged time. In addition, the social panic, stigma, and religious taboos prevented referring of the infected individuals to the health care centers. Therefore, the frequency of the parasite may not be real. The other limitation of the study was the shortage of funding because the sampling should be carried out by an expert, which was affected by the budget of the research. The advantage of the project was the use of both direct and culture methods that have not been carried out so far in this area.

### 5.1. Conclusions

The relatively low parasite outbreak in the studied samples is likely as a result of continuous monitoring and appropriate treatment.

### Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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### Footnotes

**Conflict of Interests:** The authors declare that there is no conflict of interests.

**Ethical Considerations:** The study was approved by the Infectious and Tropical Diseases Research Center, Hormozgan Health Institute, Hormozgan University of Medical Sciences, Bandar Abbas, Iran, with the Code of Ethics, HUMS.REC.1396.66.

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**Patient Consent:** The objectives of the study and the procedures were explained to all of the participants and then written informed consents were obtained.

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