



Prevalence of Vaginal Inflammation Due to *Candida* sp., *Trichomonas vaginalis* and Associated Factors Among Patients Visiting the Gynecology Clinic at Hoang Anh Gia Lai University Medical Hospital

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Abstract

Candida spp., *T. vaginalis* infections can cause genital inflammation in women, leading to many adverse effects such as increased risk of infertility and severely impacting the patient's health and quality of life.

Objective: To determine the prevalence of vaginal inflammation due to *Candida* spp., *T. vaginalis* infections and identify associated factors.

Subjects and methods: Cross-sectional research. The research subjects were women of reproductive age (18-49 years old) who visited the gynecology clinic at Hoang Anh Gia Lai University Medical Hospital, Gia Lai province.

Results: The prevalence of vaginal inflammation due to *Candida* spp., *T. vaginalis* infection was 26.7% (of which *Candida* sp. was 99.1% and *T. vaginalis* was 0.9%). The group using unsanitary water sources had a 1.6 times higher risk of infection (95% CI: 1.1-2.6), and the group that did not regularly undergo gynecological examinations had a 1.8 times higher risk of infection (95% CI: 1.1-2.9).

Conclusion: The prevalence of *Candida* spp., *T. vaginalis* infection was 26.7%, and was associated with the use of unsafe water sources and irregular gynecological checkups.

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Keywords: *Candida* spp., *T. vaginalis*, vaginal inflammation, Gia Lai, Vietnam

Introduction

Vaginitis is one of the most common health issues among women, with three main groups of pathogens: bacteria, *Candida* spp., and *Trichomonas vaginalis*. According to the World Health Organization (WHO) in 2023, approximately 75% of women of reproductive age have experienced vaginitis at least once, and 40-45% will have a recurrence, primarily due to *Candida* spp. infections ^[1]. Meanwhile, the parasite *T. vaginalis* also accounts for a significant proportion, with about 10-15% of vaginitis cases in women worldwide ^[7].

Vaginitis caused by *Candida* spp. and *T. vaginalis* not only leads to symptoms such as itching, irritation, and abnormal discharge but can also result in serious complications like pelvic inflammatory disease, infertility, miscarriage, and menstrual disorders ^[1]. The treatment of chronic and recurrent vaginitis can be costly and time-consuming, significantly affecting women's health, especially in a country like Vietnam, where conditions for sanitation and healthcare are often inadequate. Therefore, preventive measures need to be prioritized. Many research studies have been conducted on vaginitis caused by *Candida* spp. and *T. vaginalis* both globally and in Vietnam. It is essential to update information regarding *Candida* spp. and *T. vaginalis* infections in women for diagnosis, treatment, and prevention.

Thus, I initiated a research titled: “The current situation of vaginitis caused by *Candida spp.*, *T. vaginalis* and some related factors in patients visiting the gynecology department at Hoang Anh Gia Lai University Medical Center, 2023” with two objectives:

1. To determine the prevalence of *Candida spp.* and *T. vaginalis* infections in patients visiting the gynecology department at Hoang Anh Gia Lai University Medical Center in 2023.
2. To describe some factors related to *Candida spp.* and *T. vaginalis* infections in the research population.

Objects and Methods

Objects: Female patients of reproductive age (18 - 49 years) visiting the gynecology clinic at Hoang Anh Gia Lai University of Medicine and Pharmacy, Gia Lai province.

Duration: The research will be conducted from February 2023 to October 2023.

Research methodology

- Research design: Cross-sectional descriptive research.
- Research sample size: According to the sample size calculation formula.

$$n = \frac{Z_{(1-\alpha/2)}^2 p(1-p)}{d^2} \quad (1)$$

In this:

n: Minimum sample size required.

p: Prevalence rate from previous surveys (since there are no prior studies in Gia Lai province, we choose $p = 50\%$ to ensure the largest necessary sample size).

d: Absolute error, which is the desired margin of error between the sample rate (p) and the population rate (P). We select $d = 0.05$ for a 95% accuracy level.

α : Significance level. We choose $\alpha = 0.05$, thus $Z(1 - \alpha/2) = 1.96$.

Substituting these values into the formula, we calculate the sample size for the research to be $n \approx 385$ individuals. To avoid sample shortages during the research, we add 10% for incomplete data collection, resulting in a total of 423 subjects.

Inclusion criteria

Women aged 18 - 49.

Have engaged in sexual intercourse.

Agree to participate in the research after receiving a clear explanation.

Exclusion criteria

Vaginal douching within 48 hours prior to the examination.

Pregnant women.

Currently menstruating or experiencing menorrhagia.

Women who have undergone total hysterectomy or salpingectomy (ovarian removal).

Presence of genital tumors.

Mental disorders (epilepsy, schizophrenia, intellectual disabilities), inability to communicate, or deafness.

Suffering from acute or chronic illnesses.

Data collection method

We will assess the prevalence of *Candida spp.* and *T. vaginalis* using laboratory testing and direct microscopy of vaginal discharge samples.

Direct interviews with patients participating in the research will be conducted using a questionnaire to identify related factors.

Data processing

Data will be rounded to one decimal place.

All collected questionnaires will be reviewed to exclude incomplete ones.

Data will be coded and entered into a computer using EpiData 3.1 software.

Data cleaning and error correction will be performed during data entry. A random check of 20% of the questionnaires will be conducted to identify errors.

Data analysis will be performed using SPSS 20 software, including univariate analysis for each independent variable (calculating OR, 95% CI, and p-values).

Ethics in research

Participants' information will be kept confidential and used solely for research purposes.

Prior to the research, the purpose will be explained to participants, and research will only proceed with their consent.

If test results are positive, participants will be advised on prevention methods and referred to specialists for treatment.

Results

Prevalence of *Candida spp.* and *T. vaginalis* in Patients Visiting the Gynecology Department

Table 1: Prevalence of *Candida spp.* and *Trichomonas vaginalis* in the research Population

No.	Pathogen	Quantity	Percentage (%)
1	Infected	<i>Candida spp.</i>	112 26,5
		<i>T. vaginalis</i>	1 0,2
2	Not infected	310	73,3
Total		423	100

Among the 423 participants in the research, the prevalence of vaginitis caused by *Candida spp.* and *T. vaginalis* was found to be 26.7% (113/423). Specifically, the rate of *Candida spp.* infection was 26.5% (112/423), while the infection rate of *T. vaginalis* was 0.2% (1/423).

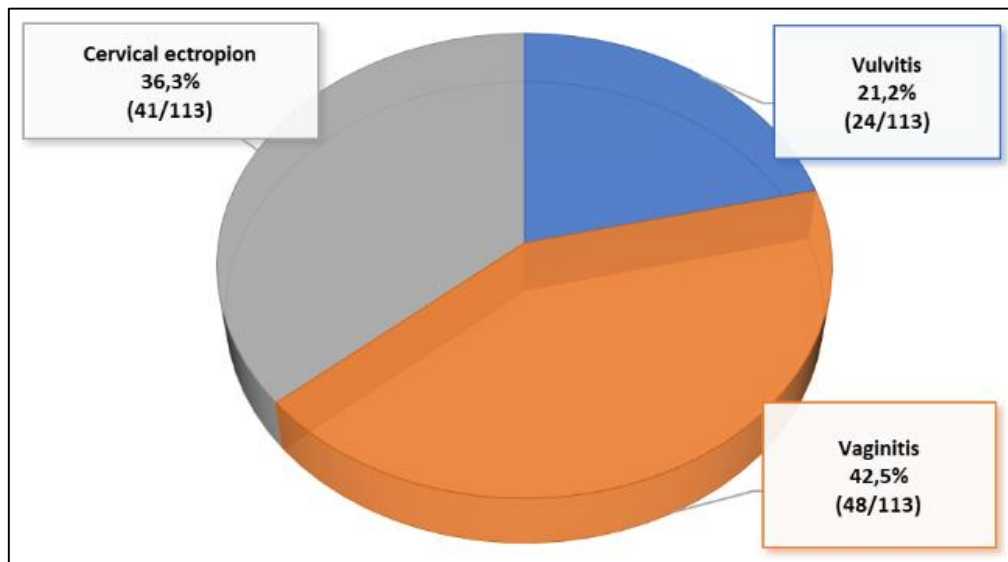


Fig 1: Infection Rates by Site of Infection

In the 113 women infected with *Candida spp.* and *T. vaginalis*: vulvitis: 21.2% (24/113), vaginitis: 42.5% (48/113) and cervical ectropion: 36.6% (41/113).

Table 2: Symptoms of Lower Genital Tract Infection in the Research Population (n=113)

No.	Symptom	Quantity	Percentage (%)
1	Abnormal genital discharge	23	20,4
2	Itching	47	41,6
3	Lower abdominal pain	15	13,3
4	Painful urination	18	15,9
5	Other	10	8,8

Interviews indicated that the most common symptoms in women with lower genital tract infections were itching (41.6%), abnormal genital discharge (20.4%), painful

urination (15.9%), lower abdominal pain (13.3%), and other symptoms (8.8%).

Some Factors Related to *Candida spp.* and *T. vaginalis* Infection

Table 3: Relationship Between the Prevalence of *Candida spp.* and *T. vaginalis* with Water Source and Regular Gynecological examination

Factor		<i>Candida spp., T.vaginalis</i> (n=423)				Total	OR (CI 95%)	p
		Positive		Negative				
		Qty	%	Qty	%			
Age Group	18-29 ¹	29	29,0	71	71,0	100	1	
	30-39 ²	54	28,9	133	71,1	187	1,02 (0,6-1,8)	0,9
	40-49 ³	30	22,0	106	78,0	136	1,03 (0,6-1,8)	0,9
Occupation	Officials and civil servants	42	28,6	105	71,4	147	1	
	Farmers	37	25,5	108	74,5	145	0,8 (0,5-1,4)	0,56
	Others	34	25,9	97	74,1	131	0,9 (0,5-1,5)	0,62
Number of Births	Nulliparous	26	25,5	76	74,5	102	1	
	1-2 births	71	29,1	173	70,9	244	1,2 (0,7-2,0)	0,49
	> 2 births	16	20,8	61	79,2	77	0,7 (0,4-1,6)	0,48
Water Source	Unsanitary*	63	32,3	132	67,7	195	1,6 (1,1-2,6)	0,016
	Sanitary	50	21,9	178	78,1	228		
Gynecological examination	None; Occasionally	87	30,2	201	69,8	288	1,8 (1,1-2,9)	0,01
	Regular Check-ups	26	19,3	109	80,7	135		

*Unsanitary water: Includes well water drawn manually, pond water, untreated river or stream water

The group using unsanitary water had a 1.6 times higher risk of infection compared to the others, with a statistically significant difference ($p < 0.05$). The group that did not have regular gynecological check-ups had a 1.8 times higher risk of infection compared to those who did, also with a statistically significant difference ($p = 0.01$).

Discussion

Prevalence of *Candida spp.* and *T. vaginalis* in Patients Visiting the Gynecology Department

In our research, among 423 women tested, 113 were found to be infected with *Candida spp.* and *T. vaginalis*, representing a prevalence rate of 26.7%. Specifically, 112 women (99.1%) were infected with *Candida spp.*, while 1 woman (0.9%)

had *T. vaginalis*. These findings are consistent with the research conducted by Trang Thị Hồng Nhung, which involved 333 women over 18 years old presenting with symptoms of vaginitis at Ho Chi Minh City University of Medicine and Pharmacy. In her research, the prevalence of vaginitis caused by *Candida spp.* was also reported at 26.7%, with *Gardnerella vaginalis* at 11.7% and *T. vaginalis* at 1.2%^[4]. Additionally, research by Cao Ngọc Thành *et al.* in A Lưới, Thừa Thiên Huế (2017) showed a prevalence of 35.3% for Gardnerella vaginosis, 17.3% for isolated *Candida spp.*, and 7.5% for mixed infections of bacteria and *Candida spp.*, with no cases of *T. vaginalis* detected^[6]. The results from these studies indicate a trend of decreasing *T. vaginalis* infections in the Vietnamese community. This decline may be attributed to improved public awareness and understanding of sexually transmitted infections, leading to the adoption of safer sexual practices. The use of Metronidazole for treating infections may also contribute to this reduction in prevalence. In our research, *Candida spp.* emerged as the predominant pathogen causing lower genital tract infections, underscoring the need for targeted educational and preventive measures to address this common issue.

Among the 113 women infected with *Candida spp.* and *T. vaginalis*, the prevalence of vulvitis was 21.2% (24/113), vaginitis was 42.5% (48/113), and cervical ectropion was 36.6% (41/113). In contrast, research by Đặng Bé Nam (2019) in Cà Mau reported a higher prevalence of 61.4% for cervicovaginitis, 33.3% for vaginitis, 3.3% for vulvitis, and 1.9% for cervicovaginitis^[3]. Several anatomical features of the female genital tract contribute to the susceptibility to infections. The large surface area of the vulva is prone to exposure to pathogens. The close proximity of the urethra, vagina, and anus facilitates the entry of urine, feces, and parasites into the vulva and vagina. Additionally, the numerous folds and creases of the vulva and vagina can trap secretions, creating an environment conducive to bacterial growth, which complicates treatment^[5]. Physiologically, the vulva and vagina possess multiple glands that maintain moisture, providing an ideal setting for pathogenic bacteria to thrive. Factors that predispose women to infections, such as pregnancy, diabetes, prolonged antibiotic use, immunosuppressive drugs, and corticosteroids, disrupt the stability of the vaginal environment and alter the pH, leading to an increased incidence of fungal vaginitis.

The symptoms reported by patients with lower genital tract infections include itching (41.6%), abnormal genital discharge (20.4%), lower abdominal pain (13.3%), painful urination (15.9%), and other symptoms (8.8%). Since the research population consisted of patients seeking care at a hospital, they often presented with acute symptoms such as itching, burning sensations, and malodorous, colored discharge (yellow, green). Typically, lower genital tract infections may develop subtly and be challenging to detect, highlighting the differences in prevalence rates between community settings and hospital-based studies.

Some Factors Related to *Candida spp.* and *T. vaginalis* Infections

The results presented in Table 3 indicate that the prevalence of *Candida spp.* and *T. vaginalis* infections was significantly higher in individuals using unsanitary water sources, with a risk increase of 1.6 times compared to those using clean water ($p < 0.05$). This finding aligns with the research by Trần Thị

Chung (2019) in Cù M'gar, which reported that individuals regularly using unsanitary water were 4.02 times more likely to contract infections compared to those using safe water ($p < 0.05$)^[2]. Similarly, Đặng Bé Nam (2019) in Cần Thơ found that individuals using water from ponds had a 3.4 times higher risk of infection compared to those using other sources ($p = 0.03$)^[3]. The increased risk associated with unsanitary water sources can be attributed to the lack of treatment and purification processes, which can alter pH levels and irritate the genital area. Furthermore, untreated water may harbor various bacteria, fungi, and protozoa that can easily invade and cause infections.

Our research also highlighted the low rate of women participating in regular gynecological check-ups, with only 31.9% reporting such visits. This low participation may be due to the stigma and embarrassment associated with lower genital tract infections, leading many women to avoid seeking medical attention. This reluctance can exacerbate the severity and complications of their conditions. Our findings suggest that women who do not undergo regular gynecological examinations are 1.8 times more likely to be infected with *Candida spp.* and *T. vaginalis* compared to those who do.

These insights underscore the importance of increasing awareness and accessibility of gynecological services, as well as addressing the social stigma surrounding these health issues, to improve early detection and treatment outcomes.

Conclusion

The prevalence of *Candida spp.* and *T. vaginalis* infections was found to be 26.7% (113/423), with 112 women (99.1%) infected with *Candida spp.* and 1 woman (0.9%) infected with *T. vaginalis*. There is a significant association between *Candida spp.* and *T. vaginalis* infections in women using unsanitary water sources (OR = 1.6), as well as among those who do not have regular or occasional gynecological check-ups (OR = 1.8).

Recommendations

- **Educational Campaigns:** Develop informational content and imagery to educate women on proper genital hygiene and safe sexual practices.
- **Regular Health Check-ups:** Encourage women of reproductive age to undergo gynecological examinations at least twice a year for early detection, screening, and treatment of potential infections.
- **Clean Water Usage:** Advocate for the use of clean water for genital hygiene to help reduce the incidence of lower genital tract infections among women.
- Implementing these recommendations can significantly improve women's health outcomes and reduce the prevalence of infections in the community.

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