

# Prevalence and independent risk factors for trichomoniasis in women receiving primary health care

Prevalência e fatores de risco independentes à tricomoníase em mulheres assistidas na atenção básica

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## Keywords

Community health nursing; Primary care nursing; *Trichomonas vaginalis*; Trichomonas infections; Trichomonas vaginitis; Prevalence; Risk factors; Primary health care

## Descritores

Enfermagem em saúde comunitária; Enfermagem de atenção primária; *Trichomonas vaginalis*; Tricomoníase; Vaginite por trichomonas; Prevalência; Fatores de risco; Atenção primária à saúde

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## Abstract

**Objective:** Evaluate the prevalence and factors associated with trichomoniasis in women receiving primary health care.

**Methods:** A cross-sectional study was developed, involving a sample of 314 medical records, randomly selected through a process of systematic sampling, among women receiving primary health care services. The socioeconomic, demographic and clinical variables were examined.

**Results:** The prevalence of *Trichomonas vaginalis* was 10.5%, and 35% of the women studied lived in rural areas. The adjusted logistic regression analysis showed that the independent predictors of the presence of trichomoniasis were: high blood pressure, unpleasant vaginal odor and dyspareunia.

**Conclusion:** In terms of practical applicability, the results can provide information for planning new nursing initiatives to prevent and reduce the prevalence of trichomoniasis in women.

## Resumo

**Objetivo:** Avaliar a prevalência e os fatores associados à tricomoníase em mulheres assistidas na atenção primária.

**Métodos:** Foi desenvolvido um estudo transversal envolvendo uma amostra 314 prontuários, aleatoriamente selecionados por um processo de amostragem sistemática, entre as mulheres atendidas em serviços de atenção básica à saúde. Foram analisadas variáveis socioeconômicas, demográficas e clínicas.

**Resultados:** A prevalência de *Trichomonas vaginalis* foi de 10,5%, sendo que 35% das mulheres analisadas residiam na zona rural. A análise de regressão logística ajustada mostrou como preditores independentes para a presença da tricomoníase: a elevada pressão arterial, odor vaginal desagradável e dispareunia.

**Conclusão:** A aplicabilidade prática dos resultados refere-se a subsídios para o planejamento de novas ações de enfermagem para a prevenção e redução da prevalência da tricomoníase em mulheres.

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## Introduction

Sexually transmitted infections constitute one of the five categories of infectious diseases that result in patients using health care systems in developed countries.<sup>(1)</sup> These diseases are difficult to detect because the individuals, especially men, are usually asymptomatic or mildly symptomatic carriers. This situation, resulting from a long process of host-pathogen coevolution, is aggravated by the large number of people afflicted and the widespread use of conventional and alternative therapeutic resources, often not backed by a medical diagnosis and/or prescription. This behavior greatly contributes to the induction and selection of resistant strains of pathogenic microorganisms and generally heightens the signs and symptoms especially in susceptible individuals.<sup>(2)</sup>

Trichomoniasis is a sexually transmitted parasite infection which serves as an example of the facts mentioned above, also with respect to the existence of different pathogenic strains of the etiologic agent *trichomonas vaginalis*.<sup>(3)</sup> The parasite colonizes the epithelium of the genitourinary tract in men and women<sup>(4)</sup> and trophozoite, in a gradually infectious way, is generally transmitted by sexual contact.<sup>(3,5)</sup>

In the female genital tract, the parasite is often reported to be colonizing the vagina and ectocervix. Individuals with severe inflammation (vaginitis) usually have discharge due to the infiltration of leukocytes, abnormal odor and vaginal itching. The vagina and cervix may have lesions and bleeding points that produce a “strawberry” appearance. The reporting of abdominal pain suggests trichomoniasis in the upper urogenital tract.<sup>(5,6)</sup>

It is important to emphasize that this sexually transmitted parasite is present in 39% of women with cervical intraepithelial neoplasia, causes infertility in 20% of cases due to tubal adhesion and occlusion, and induces premature birth, low birth weight, postpartum endometritis, stillbirth and death.<sup>(5,6)</sup> Individuals with trichomoniasis develop massive infiltration of leukocytes and bleeding points in the genital tissues which favors the transmission of the HIV virus.<sup>(5)</sup> It should be noted that

the increased secretion of cytokines promotes susceptibility to HIV.<sup>(6)</sup>

Despite the estimate that 200 million people are infected every year in the world,<sup>(7)</sup> the scientific literature shows that there has been a significant decrease in prevalence in some countries. More recent data indicates a prevalence of 13.1%<sup>(8)</sup> in Brazil, although reporting is still irregular throughout the country.<sup>(9)</sup>

The setting up of Family Health Units in rural and urban areas, managed by qualified nurses, contributes significantly not only toward monitoring these sexually transmitted parasites, but also results in pap tests being conducted regularly and the effects of the treatment being monitored, thus hindering the spread of the parasite, the establishment of its complications in the reproductive system and/or incidence of chronic infections. It also raises the number of women who benefit as they move into the reproductive age group.<sup>(10)</sup>

Trichomoniasis requires a systemic treatment. The Brazilian Ministry of Health recommends a single 2-g oral dose of metronidazole or 500mg of metronidazole every 12 hours for seven days. The treatment should be done together with the sexual partner. For pregnant women, topical intravaginal administration is recommended.<sup>(2,11)</sup> Although metronidazole has selective toxicity, the use of this drug needs to be monitored by nursing staff because it induces the selection of resistant *Trichomonas vaginalis* strains, has carcinogenic potential, experimentally confirmed *in vivo*, and crosses the trans-placental barrier.<sup>(12,13)</sup>

The aim of this study was to examine the risk factors associated with the prevalence of trichomoniasis in women receiving care in Family Health Units in the municipality of Vitória de Santo Antão (state of Pernambuco).

## Methods

This is a cross-sectional study involving women from 15 to 78 years of age, based on an analysis of medical records in the 26 Family Health Units in the city of Vitória de Santo Antão, Pernambuco, in

Northeastern Brazil, from January 2010 to January 2012. We excluded records with incomplete data in relation to pap testing, since this prevents the identification of trichomoniasis.

To estimate the sample size, the SampleXS program [Brixton Health, Brixton, UKI2, UK] was used, based on the following formula:  $n = A/(E*E+(A/N))$  where  $n$  = sample size;  $A = 3.8416PQW$ ;  $P$  = population prevalence expressed in a percentage;  $Q = (100 - P)$ ;  $E$  = maximum acceptable sample error;  $W$  = probable design effect;  $N$  = population size. The calculation of the sample size was based on an estimated prevalence of 4% of trichomoniasis.<sup>(14)</sup> The reference population was comprised of 12,500 registered medical records, using a confidence level of 95%, a sampling error of 3% and a design effect of 1.5. The minimum sample size was 241 records. To offset any losses or rejections, 30% was added to this number, resulting in a final sample of around 313 records. To select the sample, the total number of medical records distributed among all the basic health units in the city was collected and through a systematic sampling the proportional shares were prepared by the respective health units. All the socioeconomic and demographic, lifestyle and epidemiological information contained in the medical records was retrieved and recorded in data collection instruments designed for this purpose.

The data was collected by the researchers and the entire team was properly trained by the project coordinators aimed at ensuring the accuracy of the systematic sampling technique. The whole data collection process was monitored by the supervisors and coordinators of the research project.

The data analysis was conducted with the help of Epidata software Version 3.1 [EpiData Association, Odense, DK]. In order to catch errors, the logging of the data was repeated, and through the duplicate files comparison validate function typing errors were detected and corrected. The data was analyzed using the statistical program SPSS Version 17 [SPSS Inc., Chicago, IL, USA]. In the description of the proportions, there was an approximation of the binomial distribution to

the normal distribution by the confidence interval ( $CI_{95\%}$ ).

In the comparison of the proportions, the Mantel-Haenszel and Pearson's chi-square test or linear trend test were used. For purposes of interpretation, the type I error limit was up to 5% ( $p \leq .05$ ).

Multivariate analysis was used to estimate the independent contribution of each variable toward the chance of trichomoniasis being present. For building the model, all the variables from the bivariate analysis were tested. For this purpose, binary logistic regression through the backward LR method was used.

The conceptual model constructed to explain trichomoniasis took into account socioeconomic, demographic and lifestyle factors, such as age, geographic area of residence; cervical intraepithelial neoplasia; friable cervix; whether the woman had children; and vaginal discharge.

The designing of the study complied with national and international standards of ethics in research involving humans.

## Results

Of the 326 eligible medical records for the application of the data collection instrument, 12 were excluded, due to the data not meeting the accuracy criteria. The final sample consisted of 314 records that were analyzed. The age limits of the women ranged from 15 to 78 years of age, with a median of 36 (IQ 25-48) years. The prevalence of *Trichomonas vaginalis* was 10.5% ( $CI_{95\%}$ : 7.3-14.4), and 35% ( $CI_{95\%}$ : 29.7-40.3) of the women from the study lived in rural areas.

Table 1 shows the association between socioeconomic, demographic and lifestyle characteristics in cases where *Trichomonas vaginalis* was detected by a Pap test. There was no significant association with the presence of *Trichomonas vaginalis*.

In the multivariate logistic regression analysis (Table 2), the independent risk factors for trichomoniasis were hypertension ( $OR=3.53$   $CI_{95\%}$  1.38-9.05), unpleasant vaginal odor ( $OR=5.66$   $CI_{95\%}$  1.80-17.85) and dyspareunia ( $OR=3.37$   $95\% CI_{95\%}$  1.29-8.82).

**Table 1.** *Trichomonas vaginalis* according to socioeconomic, demographic and lifestyle variables in women who underwent Pap tests

Independent variables	n	Trichomonas vaginalis		PR (CI <sub>95%</sub> )	p-value*
		With trichomonas n(%)	Without trichomonas n(%)		
Age (years)	314			0.84(0.39-1.78)	0.643 <sup>†</sup>
15-25 (young people)	81	8(9.88)	73(90.12)		
26-59 (adults)	212	25(11.80)	187(88.2)		
+ 60 (seniors)	21	-	21(100)		
Residential area	314			1.69(0.79-3.61)	0.170
Urban	204	25(12.3)	179(87.7)		
Rural	110	8(7.3)	102(92.4)		
Occupation <sup>a</sup>	267			1.04(0.51-2.12)	0.905
Yes	163	18(11.0)	145(89.0)		
No	104	11(10.6)	93(89.4)		
Marital status <sup>b</sup>	225			2.49(0.35-17.58)	0.288
Yes	203	23(11.34)	180(88.66)		
No	22	1(4.55)	21(95.45)		
Education (years) <sup>c</sup>	280			0.63(0.24-1.66)	0.266
> 9	256	27(10.55)	229(89.45)		
< 9	24	4(16.6)	20(83.4)		

Legend: CI<sub>95%</sub>: 95% confidence interval; PR: prevalence ratio; \*Mantel-Haenszel Chi-square; <sup>†</sup>Linear trend Chi-square; a: 47 of the medical records did not have information regarding the occupation of the women; b: 89 women did not have this information in their records; c: 34 women did not have this information in their records

**Table 2.** Independent predictors for trichomoniasis, according to the multivariate logistic regression analysis, in women receiving care in the basic health units

Risk factors	Final model		
	Adjusted OR <sup>¥</sup>	CI <sub>95%</sub>	p-value*
Hypertension			0.008
Negative	1	Ref	
Positive	3.53	[1.38-9.05]	
Unpleasant vaginal odor			0.003
Negative	1	Ref	
Positive	5.66	[1.80-17.85]	
Dyspareunia			0.013
Absence	1	Ref	
Presence	3.37	[1.29-8.82]	

Legend: n = 212; OR: Odds ratio; CI: 95% confidence interval; Ref: Reference category; \*Likelihood ratio test; ¥ Adjusted model for the age variables; residential area; cervical intraepithelial neoplasia; friable cervix; whether the woman had children; and vaginal discharge

## Discussion

The study had certain limitations, which must be taken into account when interpreting the results. It is a cross-sectional study in which cause and effect cannot be determined; the population is very homogeneous from an ethnic point of view, although the sample had been carefully selected to exclude confounding factors in the analysis; and the use of secondary data from the clinical records.

In terms of practical applicability, the results can provide information for planning new nursing initiatives to prevent and reduce the prevalence of trichomoniasis in women.

Among the positive features of the study is its geographic scope, since it was conducted in all the health care units of the municipality, and the sample size, which was sufficient to ensure prevalence estimates, in addition to being able to identify factors associated with trichomoniasis, by using the OR, made possible by the multivariate logistic regression analysis.

Trichomoniasis is a disease that is easy to present and diagnose, but even with all these facilitating factors, there is a high prevalence both internationally and nationally.<sup>(15)</sup> It is estimated that the prevalence of the parasite infection is around 200 million cases each year worldwide.<sup>(7)</sup> In Brazil, the rate hovers around 4%.<sup>(15)</sup>

The prevalence of *Trichomonas vaginalis* in this sample was 10.5% (CI<sub>95%</sub>: 7.3-14.4), similar to the results found in another study conducted in southern Brazil in the state of Paraná in 2009<sup>(8)</sup> with a 13.1% prevalence of trichomoniasis. Prevalences of 12.6%<sup>(16)</sup> and 18.4% were found in the literature.<sup>(17)</sup> The main reason for the difference between data and results is due to the profile of the populations examined. The first study was conducted in menopausal women and the second in women with HIV positive.

The difference of prevalence of *Trichomonas vaginalis* varies considerably according to the characteristics of the study population and the diagnostic method used.<sup>(18)</sup>

Although there are more sensitive and specific techniques for detecting *Trichomonas vaginalis*,<sup>(19)</sup>

primary care in developing countries, such as Brazil, still utilize the Pap method, originally developed to be used as a screening test to detect precancerous lesions in the cervix,<sup>(20)</sup> despite the existence of scientific reports that disapprove of its use in isolation due to its inherent limitations,<sup>(19,21,22)</sup> such as sensitivity between 60 and 70% and a high rate of false positive results.<sup>(23)</sup>

Therefore, it is essential to decide on a better method for checking women for *Trichomonas vaginalis*, especially in developing countries, such as Brazil, by developing more effective public policies to combat trichomoniasis and other STIs.

In the 1990s the Brazilian Ministry of Health decided to shift the focus of essentially hospital-based health care to act effectively within the home. The Family Health Strategy, structured on the basis of the Family Health Units, provides communities with a multidisciplinary team trained to promote health in a contextualized manner, i.e., taking into account the prevailing social, economic and even political aspects.<sup>(24)</sup>

Although the importance of this service is undeniable, the participation of sexually active women is weak in primary health care.<sup>(20)</sup> The results suggest that this inadequate behavior is related to low levels of education combined with lack of knowledge about parasitic infections in terms of STIs and the fallacy that sex with a steady partner will prevent getting the parasite.

In this study, education and socioeconomic level were not significant predictive factors for the prevalence of trichomoniasis, but it is important to bear in mind their possible contribution toward the development of trichomoniasis.<sup>(25)</sup> In the analysis conducted, there was a 10.54% rate of women with up to nine years of schooling who were carriers of trichomoniasis. A study carried out in the state of Sergipe found that 62.72% of the women with incomplete elementary school had this affliction.<sup>(4)</sup> There appears to be an important connection between women from low income classes with a low level of education and a high risk of infection with *Trichomonas vaginalis*.<sup>(15)</sup>

In this research, the independent predictors observed in the multivariate analysis for the prevalence

of trichomoniasis were women with hypertension, vaginal odor and symptoms of dyspareunia.

Women suffering from hypertension were at higher risk of contracting *Trichomonas vaginalis*. This finding may be related to morphological and physiological descriptions that favor the establishment of the pathogen.<sup>(4,8)</sup> Under natural conditions, the epithelium of the female reproductive tract undergoes cyclical changes involving hormonal cycles, declining steroid hormones, changes in the pH and flora combination and intense peeling of the tissue. These factors favor the establishment of pathogenic microorganisms, especially among adult women.<sup>(4,8)</sup> Regular use of oral contraceptives can also cause an accumulation of glycogen in the cervical epithelium, changes in local pH and peeling of the epithelium, in addition to raising the blood pressure level in some women, thereby contributing to high blood pressure which occurs in 5% of the women who use these drugs for five years, although they usually have few clinical consequences.<sup>(26)</sup>

A detailed evaluation of these independent associations may result in important findings, such as reassessing the use of contraceptive drugs, since both pathologies more commonly evolve in asymptomatic or oligosymptomatic forms in most women of reproductive age.

Another independent risk factor indicating the presence of trichomoniasis was unpleasant vaginal odor. Studies conducted showed that 20% of the women infected with *Trichomonas vaginalis* develop a foul odor similar to rotten fish, as well as profuse discharge which can be foamy, if associated with *Micrococcus alcaligenes aerogenes*, and mucopurulent.<sup>(27,28)</sup> However, previous studies<sup>(15,25)</sup> found that the odor was present in 25% to 50% of the women studied.

Dyspareunia, which is pain during or after intercourse, caused by trauma, infection or inflammation, affects women in the sexually active age range. The most common infections that can cause this symptom are *cocci*, *Gardnerella* and *Trichomonas vaginalis*.

In a study that tied dyspareunia to other agents, there was a 26.22% association between *Trichomonas vaginalis*, detected through a pap test, and pain

during or after sexual intercourse, which corroborates the results obtained in this paper.<sup>(29)</sup>

## Conclusion

The prevalence of *Trichomonas vaginalis* was 10.5%, with foul odor, dyspareunia and hypertension as the independent risk factors.

## Collaborations

Lima MCL contributed toward the project design, writing of the article, data acquisition and final approval of the version of the manuscript to be published. Albuquerque TV collaborated with the project design, data interpretation, data collection and analysis and final approval of the version of the manuscript to be published. Neto AC participated in the statistics analysis, writing, critical review, data interpretation and final approval of the version of the manuscript to be published. Rehn VNC cooperated with the design and outline of the study, data collection, writing of the manuscript, supervision and final approval of the version of the manuscript to be published.

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