The frequency of *Trichomonas vaginalis* in Pap smear and liquid-based cytology (SurePath™) between 2013 and 2018 in a reference laboratory in Fortaleza, Brazil

Frequência de Trichomonas vaginalis no exame de Papanicolaou e citologia em base líquida (SurePath™) entre 2013 e 2018 em um laboratório de referência em Fortaleza, Brasil

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ABSTRACT

Introduction: *Trichomonas vaginalis* (Tv) is a parasite responsible for the most frequent non-viral sexually transmitted infection and causes more than 250 million new cases around the world each year. Frequently, Tv is identified in cervical cancer screening. **Objective:** To assess the frequency of Tv identified on cytology between 2013 and 2018 in a private Laboratory at Fortaleza, Brazil. **Methods:** Cases from the files of a laboratory in Fortaleza, Brazil, were searched for diagnoses of Tv on cytology (Pap smear and SurePath™ [SP]) between 2013 and 2018, and the frequency of infection in each year, as well as differences between the years, were calculated. A linear regression test was performed to analyze the relationship between time and infection with a 95% confidence interval. The research was approved by an ethics committee. **Results:** The mean age of the patients was 35.9 (+12.5) years in the Pap smear group and 33.4(+11.9) years in the liquid-based cytology group. Tv was diagnosed in 281 of 207,863 patients (0.14%) (113 [0.12%] in the Pap smear group and 168 [0.15%] in SP cytology). Assessing year by year differences, it was observed that Tv was identified on cytology in 36 of 33,193 in 2013 (0.1%) (Pap smear=19/ 19,734 [0.1%]; SP=17/ 13,459 [0.13%], 50 of 34,661 in 2014 (0.14%) (Pap smear=22/ 16,358 [0.13%]; SP=28/ 18,303 [0.15%]), 34 of 33,623 in 2015 (0.1%) (Pap smear=10/ 14,501 [0.07%]; SP=24/ 19,122 [0.13%]), 29 of 34,492 in 2016 (0.1%) (Pap smear=9/ 15,629 [0.06%]; SP=20/ 18,863 [0.1%]), 52 of 35,446 in 2017 (0.15%) (Pap smear=22/ 15,948 [0.14%]; SP=30/ 19,498 [0.15%], and 80 of 36,448 in 2018 (0.22%) (Pap smear=31/ 15,408 [0.2%]; SP=49/ 21,040 [0.23%]). **Conclusion:** There was a tendency towards increased frequency of Tv diagnosis in the gynecologic cytology group (Pap smear or SP), mainly in the last year, reflecting what is observed using more sensitive methods.

Keywords: cytology; diagnosis; prevalence; Trichomonas vaginalis.

RESUMO

Introdução: *Trichomonas vaginalis* (Tv) é um parasita responsável pela infecção sexualmente transmissível não viral mais frequente e incidindo em mais de 250 milhões de novos casos a cada ano no mundo. Frequentemente, o Tv é identificado no rastreamento citológico do câncer de colo do útero. **Objetivo:** Avaliar a frequência de Tv identificada por citologia entre 2013 e 2018 em um laboratório privado em Fortaleza, Brasil. **Métodos:** Foram pesquisados casos dos prontuários de um laboratório em Fortaleza, Brasil, para dianóstico de Tv por citologia (exame de Papanicolaou ou SurePath™ [SP]) entre 2013 e 2018, e foram calculados a frequência da infecção a cada ano bem como as diferenças entre eles. Um teste de regressão linear foi aplicado para analizar a relação entre o tempo e a infecção com intervalo de confiança de 95%. A pesquisa foi aprovada pelo comitê de ética. **Resultados:** A idade média das pacientes foi 35.9 (+12.5) anos na citologia convencional (CC) e 33.4 (+11.9) anos no grupo de citologia em meio líquido. Tv foi diagnosticada em 281 de 207.863 pacientes (0,14%) (113 [0,12%] no grupo de CC e 168 [0,15%] no grupo de SP). Avaliando ano a ano, foi observado que o Tv foi identificado em 36 de 33.193 em 2013 (0,1%) (CC=19/ 19.734 [0,1%]; SP=17/ 13.459 [0,13%], 50 de 34.661 em 2014 (0,14%) (CC=22/ 16.358 [0,13%]; SP=28/ 18.303 [0,15%]), 34 de 33.623 em 2015 (0,1%) (CC=10/ 14.501 [0,07%]; SP=24/ 19.122 [0,13%]), 29 de 34.492 em 2016 (0,1%) (CC=9/ 15.629 [0,06%]; SP=20/ 18.863 [0,1%]), 52 de 35.446 em 2017 (0,15%) (CC=22/ 15.948 [0,14%]; SP=30/ 19.498 [0,15%], e 80 de 36.448 em 2018 (0,22%) (CC=31/ 15.408 [0,2%]; SP=49/ 21.040 [0,23%]). **Conclusão:** Há a tendência de aumento na frequência de diagnóstico de Tv na citologia (Papanicolaou ou SP), principalmente no último ano, refletindo o que já tem sido observado por métodos mais sensíveis.

Palavras-chave: citologia, diagnóstico, prevalencia, Trichomonas vaginalis.

INTRODUCTION

Trichomonas vaginalis (Tv) is a parasite that causes sexually transmitted infection (vaginitis or urethritis) as an extracellular pathogen and also influences the human host's immune system and vaginal microbiota[1]. It is considered the most frequent non-viral sexually transmitted infection, with more than 250 million new cases worldwide each year[2]. Using protein chain reaction (PCR), the prevalence of Tv ranges from 3.9% in Latin America to 24.6% in Southern Africa[3]. However, based on cytology, this frequency drops to between 0.17 and 0.2%[4]. It was demonstrated that the frequency of infection does not decrease with age[5] and may even increase[6]. Also, it is more frequent in HIV-infected pregnant women[7]. Tv may be associated with adverse outcomes in pregnancy[8], and a meta-analysis demonstrated that infection by Tv increases the risk of HIV acquisition by about 50%[9].

Although vaginal discharge, dysuria, and malodor could occur in patients infected with Tv, many women are asymptomatic and a reliable laboratory method is necessary to diagnose it[10].

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The best method for diagnosing Tv is PCR. However, morphological methods are still used as a tool for the diagnosis of Tv in low-income countries, although these are low-sensitivity methods[10]. On the other hand, it has been demonstrated that changing the screening strategy of cervical cancer screening for human papillomavirus (HPV) testing will increase Tv infection due to a lack of cytology diagnosis[11].

This study aimed to identify the prevalence of Tv on Pap smear and in liquid-based cytology in the screening of cervical cancer between 2013 and 2018 in a private laboratory located in a big city in northeastern Brazil.

METHODS

This is an observational, longitudinal, time-series study on the files of Professor Eleuterio's laboratory, that performs cervical cancer screening of gynecologists from Ceara State and others nearby in Brazil. Tv cases were assessed according to cytological screening for cervical cancer using Pap smear and liquid-based cytology (SurePath™) (BD — Burlington, NC, USA), between 2013 and 2018. The frequency of the infection in each year was evaluated, and the relationship between time and disease was analyzed.

A linear regression test was performed to analyze the relationship between time and infection, with a 95% confidence interval using Graphpad Prism 7. The research was approved by the ethics committee of Christus University Center (No. 2.762.001).

RESULTS

The age of the patients ranged from 20 to 63 (35.9±12.5) years in the Pap smear group and 16 to 64 (33.4±11.9) years in the liquid-based cytology (SurePath™ [SP]) group.

During this period, 207,863 cytology tests (97,578 Pap smears and 110,285 SP cytology) were analyzed in the laboratory. Tv was diagnosed in 281 patients (0.14%) (113 [0.12%] in Pap smears and 168 [0.15%] in SP cytology).

A year-by-year assessment showed that Tv was identified in cytology in 36 out of 33,193 in 2013 (0.1%) (Pap smear=19/ 19,734 [0.1%]; SP=17/ 13,459 [0.13%]), 50 of 34,661 in 2014 (0.14%) (Pap smear=22/ 16,358 [0.13%]; SP=28/ 18,303 [0.15%]), 34 of 33,623 in 2015 (0.1%) (Pap smear=10/ 14,501 [0.07%]; SP=24/ 19,122 [0.13%]), 29 of 34,492 in 2016 (0.1%) (Pap smear=9/ 15,629 [0.06%]; SP=20/ 18,863 [0.1%]), 52 of 35,446 in 2017 (0.15%) (Pap smear=22/ 15,948 [0.14%]; SP=30/ 19,498 [0.15%]), and 80 of 36,448 in 2018 (0.22%) (Pap smear=31/ 15,408 [0.2%]; SP=49/ 21,040 [0.23%]) (**Figure 1**).

DISCUSSION

Worldwide, the prevalence of Tv detected by PCR is increasing, but most services do not have access to PCR. Therefore, Pap smears used for cervical cancer screening remain the primary diagnostic method for finding this infection, mainly in low-income countries. Based on cytology, there is no evidence on this increase to date. Although the sensitivity of Pap smear and liquid-based cytology is considered low, it was demonstrated that the specificity of those tests for Tv is good (97%). Thus, the treatment in positive cases is mandatory[12].

In our study, both Pap smear and SP cytology showed a constant prevalence of cytological diagnosis of Tv until 2018, when the frequency increased, mainly in SP cytology. Howell et al.[12] consider that liquid-based tests remove components that may make the visualization of microorganisms difficult but, on the other hand, could introduce artifacts from new challengers. Regardless, the authors consider the detection of Tv to be acceptable in gynecological cytology. It seems that the final liquid-based cytology lacks a "dirty" background or cytolysis and allowed a more straightforward identification of the organisms[13].

The frequency of Tv was similar in the Pap smear and SP groups (0.12 and 0.15%, respectively), which is in agreement with Aslan et al.[13] who observed the prevalence of Tv in Pap smear and SP in 0.14 and 0.17%, respectively.

Very few studies have evaluated the tendency of Tv frequency. Joo et al.[14] studied the diagnosis of Tv in South Korea between 2009 and 2014 and showed that its incidence was increasing, especially in 2013 and 2014. In our study, there was a constant number until 2018, when there was a significant increase, from 0.1% in 2013 to 0.22% in 2018 in all tests. Specifically, in the Pap smear group, it increased from 0.1% in 2013 to 0.2% in 2018, and the SP group increased from 0.13% in 2013 to 0.23% in 2018.

Another Brazilian study found a higher frequency of Tv in wet smear[15]. This difference could point to the crucial aspect of our research. The study was conducted using cytology (low sensitivity to diagnose Tv) in women from the private service.

CONCLUSION

It was concluded that, even using a low to medium sensitivity method to diagnosis, there is a tendency to increase the frequency of Tv diagnosis in gynecological cytology (Pap smear or SP), mainly in the last year, reflecting what is observed using more sensitive methods.

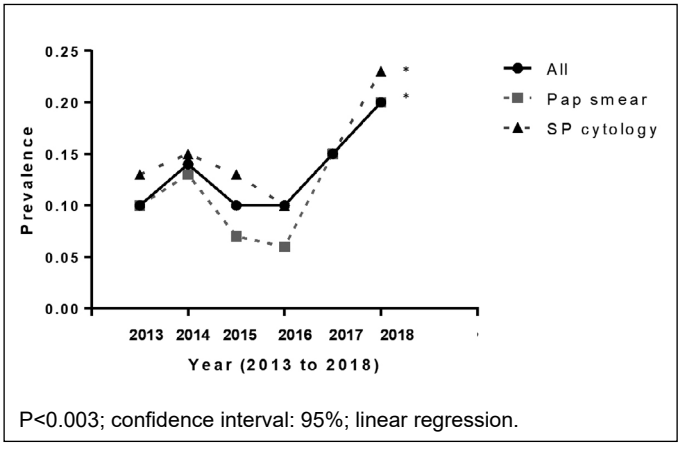

Figure 1 – Prevalence of diagnosis in gynecological cytology (all), conventional Papanicolaou cytology (Pap smear) and Sure Path™ cytology (SP cytology) between 2013 and 2018 in a private laboratory in Fortaleza, Brazil.

Participation of each author

José Eleutério Junior, M.D., Ph.D., M.I.A.C. contributed to the conception of the work and the acquisition, analysis, and interpretation of data for the work. He also provided the final approval of the version to be published. Renata Mírian Nunes Eleutério, M.Sc. contributed to the conception of the work and the acquisition of data for the work. She reviewed the content and provided the final approval of the version to be published. Maria Natalice Lima da Silva contributed to the acquisition of data for the work and provided the final approval of the version to be published. Maiara Nunes Alexandre Marques contributed to the acquisition of data for the work and provided the final approval of the version to be published.

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Conflict of interests

There is no conflict of interest to be reported.

Statement of Ethics

The study protocol was approved by the research institute's committee (Christus University Center [No. 2.762.001]) on human research.

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