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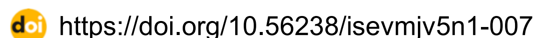
TREATMENT OF TRICHOMONIASIS: CLINICAL MANAGEMENT AND IMPACT ON WOMEN'S HEALTH

TRATAMENTO DA TRICOMONÍASE: MANEJO CLÍNICO E IMPACTO NA SAÚDE DA MULHER

TRATAMIENTO DE LA TRICOMONIASIS: MANEJO CLÍNICO E IMPACTO EN LA SALUD DE LA MUJER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ABSTRACT
Trichomoniasis, caused by the protozoan Trichomonas vaginalis, is one of the most prevalent non-viral sexually transmitted infections (STIs) worldwide, with serious repercussions for women's health. This narrative review analyzes contemporary clinical management, highlighting changes in therapeutic guidelines in which the metronidazole regimen (500 mg, twice daily for 7 days) has demonstrated superiority over the single 2 g dose in reducing recurrence in women. Diagnosis has evolved with the consolidation of Nucleic Acid Amplification Tests (NAATs) as the gold standard, which are essential for identifying the approximately 85% of asymptomatic cases. The study addresses the epidemiological synergy between the parasite and increased susceptibility to HIV (a 50% increase in risk), mediated by inflammatory processes and damage to the epithelial barrier, as well as serious obstetric risks such as preterm birth and premature rupture of membranes. It is concluded that effective management requires the concomitant treatment of sexual partners through Expedited Partner Therapy (EPT) and systematic screening in vulnerable populations to interrupt the chain of transmission and mitigate reproductive harm.

Keywords: *Trichomonas vaginalis*. Trichomoniasis. Metronidazole. Women's Health. Vaginal Microbiota. Sexually Transmitted Infections.

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RESUMO
A tricomoníase, causada pelo protozoário Trichomonas vaginalis, é uma das infecções sexualmente transmissíveis (IST) não virais mais prevalentes no mundo, apresentando sérias repercussões para a saúde feminina. Esta revisão narrativa analisa o manejo clínico contemporâneo, destacando a mudança nas diretrizes terapêuticas, em que o esquema de metronidazol (500mg, 2x/dia por 7 dias) demonstrou superioridade sobre a dose única de 2g na redução de recidivas em mulheres. O diagnóstico evoluiu com a consolidação dos Testes de Amplificação de Ácido Nucleico (NAAT) como padrão-ouro, essenciais para identificar os cerca de 85% de casos assintomáticos. O estudo aborda a sinergia epidemiológica entre o parasita e o aumento da suscetibilidade ao HIV (aumento de 50% no risco), mediada por processos inflamatórios e danos à barreira epitelial, além dos graves riscos obstétricos, como parto prematuro e ruptura prematura de membranas. Conclui-se que o manejo eficaz exige a abordagem concomitante dos parceiros sexuais através da Terapia de Parceiro Expedita (EPT) e um rastreio sistemático em populações vulneráveis para interromper a cadeia de transmissão e mitigar danos reprodutivos.

Palavras-chave: *Trichomonas vaginalis*. Tricomoníase. Metronidazol. Saúde da Mulher. Microbiota Vaginal. Infecções Sexualmente Transmissíveis.

RESUMEN
La tricomoniasis, causada por el protozoario Trichomonas vaginalis, es una de las infecciones de transmisión sexual (ITS) no virales más prevalentes en el mundo, con serias repercusiones para la salud de la mujer. Esta revisión narrativa analiza el manejo clínico contemporáneo, destacando los cambios en las directrices terapéuticas, en las que el esquema de metronidazol (500 mg, dos veces al día durante 7 días) ha demostrado superioridad frente a la dosis única de 2 g en la reducción de recidivas en mujeres. El diagnóstico ha evolucionado con la consolidación de las Pruebas de Amplificación de Ácidos Nucleicos (NAAT) como patrón oro, esenciales para identificar aproximadamente el 85% de los casos asintomáticos. El estudio aborda la sinergia epidemiológica entre el parásito y el aumento de la susceptibilidad al VIH (incremento del 50% del riesgo), mediada por procesos inflamatorios y daños a la barrera epitelial, además de los graves riesgos obstétricos, como el parto prematuro y la ruptura prematura de membranas. Se concluye que el manejo eficaz requiere el tratamiento concomitante de las parejas sexuales mediante la Terapia de Pareja Expedita (EPT) y un cribado sistemático en poblaciones vulnerables para interrumpir la cadena de transmisión y mitigar los daños reproductivos.

Palabras clave: *Trichomonas vaginalis*. Tricomoniasis. Metronidazol. Salud de la Mujer. Microbiota Vaginal. Infecciones de Transmisión Sexual.

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1 INTRODUCTION

Trichomoniasis is a sexually transmitted infection (STI) caused by the protozoan *Trichomonas vaginalis* and can affect both men and women - often asymptomatic (between 50% and 60%) and in pregnant women it can cause low fetal weight, premature births and premature rupture of membranes. (GINOCCHIO *et al.,* 2012; Workowski *et al.,* 2021). The vaginal microbiota is made up of numerous microorganisms that live commensal with the body - and which normally change with age - and protects the vaginal canal from opportunistic infections. (Silva, 2024). However, the so-called dysbiosis can occur, an imbalance between microorganisms and leaves the woman susceptible to infections in the vaginal tract, such as vulvovaginitis (Bagga Arora, 2020; Silva, 2024).

Infection by *Trichomonas vaginalis* represents a global public health challenge, accounting for millions of new cases annually and presenting a prevalence higher than the sum of chlamydia and gonorrhea infections in several populations (Kissinger et al., 2020). Although often asymptomatic, trichomoniasis in women can manifest itself through purulent vaginitis, pruritus, and dysuria, significantly impacting quality of life (Van Gerwen et al., 2021). In addition to clinical discomfort, the presence of the parasite alters the vaginal microenvironment, facilitating the transmission and acquisition of the Human Immunodeficiency Virus (HIV) and other viral pathogens (Mabaso et al., 2021).

Despite its high prevalence and its relevant clinical and epidemiological repercussions, trichomoniasis remains underdiagnosed and often neglected in the context of sexual and reproductive health care, especially when compared to other sexually transmitted infections with greater visibility in screening and control programs (Kissinger *et al*., 2020; Mabaso *et al*., 2021).

In maternal health, trichomoniasis is strongly associated with adverse outcomes, including preterm birth and low birth weight, which makes timely screening and treatment vital elements of antenatal care (Cenkowski et al., 2023). Historically, treatment has been based on single doses of nitroimidazoles; however, recent evidence has demonstrated unacceptable rates of recurrence with this regimen in women, forcing a revision of international guidelines (Workowski et al., 2021). In view of the diagnostic complexity and nuances in pharmacological management, it is imperative to consolidate the current evidence on the therapeutic approach and its implications for women's health.

In this context, contemporary strategies for coping with trichomoniasis have emphasized expanding access to more sensitive diagnostic methods, such as nucleic

acid amplification tests, as well as the adoption of more effective and individualized therapeutic regimens. The identification and simultaneous treatment of sexual partners emerge as key measures to reduce reinfection and interrupt the chain of transmission, especially in vulnerable populations (Van Gerwen et al., 2021; Cenkowski et al., 2023). In addition, the growing report of metronidazole resistance reinforces the need for continuous surveillance, development of alternative therapies, and periodic updating of clinical recommendations (Mabaso et al., 2021; Workowski et al., 2021). Thus, the appropriate management of female trichomoniasis should be understood not only as a one-off clinical intervention, but as an integral part of a broader sexual and reproductive health strategy, with a direct impact on the reduction of gynecological, obstetric, and infectious complications.

In view of this scenario, this article aims to discuss the treatment of trichomoniasis from the perspective of contemporary clinical management and its impact on women's health, considering diagnostic advances, current therapeutic strategies, and their gynecological, obstetric, and epidemiological implications in the light of the available evidence.

2 METHODOLOGY

The present investigation is a bibliographic review of a narrative nature, structured with the purpose of synthesizing and evaluating the most current guidelines and scientific evidence regarding the "Treatment of Trichomoniasis: Clinical Management and Impact on Women's Health". The selection of the material was carried out through a search in the PubMed database, using the descriptors "Trichomonas Infections", "Diagnosis" and "Treatment", interconnected by the Boolean operators AND and OR, in strict accordance with the structured vocabulary MeSH. Studies published in the last twenty years, with full availability and written in Portuguese or English, which directly contemplated therapeutic tactics and the clinical impact on the female public, were incorporated. Excluded from the scope were research without direct thematic adherence, duplicates and reviews of low scientific rigor. The selection process involved the screening of titles and abstracts, followed by the critical analysis of the full texts to validate relevance. The evidence extracted was compiled in a descriptive and organized manner.

3 RESULTS AND DISCUSSION

The vaginal microbiota undergoes changes according to the stages of development of the organism, that is, a girl has a vaginal microbiome composed of anaerobic bacteria Gram-negative (such as *Fusobacteruim sp*.) and Gram-positive bacteria (such as *Peptococcus sp., and Actinomyces sp*.) and some aerobic bacteria, such as *Streptococcus sp.,* and *Enterococcus fecalis* (Bagga Arora, 2020). In the microbiota of an adult woman, *Lactobacillus sp*. predominates, lactic acid-producing organisms, which allows the acidic vaginal pH to be maintained and, in this way, contain infections by dysbiosis and opportunistic microorganisms (Bagga Arora, 2020). However, during pregnancy, immunological and hormonal changes occur that alter the vaginal microbiome, which can cause dysbiosis and, consequently, infection by opportunistic organisms, such as *T. vaginalis*. (Bagga Arora, 2020).

The evolution in the management of trichomoniasis reflects the need to overcome the high rates of reinfection and persistence of the parasite. Recent randomized controlled trials have drastically altered the standard therapeutic recommendation for women: the metronidazole regimen of 500 mg, twice daily, for seven days, is now preferable to the single dose of 2g (Workowski et al., 2021). This shift is based on the superiority of the multi-day regimen in achieving microbiological cure and reducing relapses by about 50%, as evidenced in cohorts of cisgender women (Kissinger et al., 2018; Van Gerwen et al., 2021).

In the diagnostic field, the transition from traditional methods, such as fresh microscopy (which has low sensitivity), to Nucleic Acid Amplification Tests (NAAT) has been consolidated as the "gold standard" (Mabaso et al., 2021). The use of NAAT allows the detection of the parasite even at low loads and in asymptomatic patients, and is essential for the control of community transmission (Workowski et al., 2021). However, there is a correct period for the detection of T. vaginalis after treatment, which is after 3 weeks for women who received multiple dosing and 4 weeks for those who received a single dose of metronidazole, because periods before it can identify a serological scar rather than a truly active infection (CRAIG-KUHN *et al.,* 2025).

In addition, universal screening in HIV-positive women is strongly recommended annually, given the epidemiological synergy between the two infections (Kissinger et al., 2020). This is due to the greater propensity to contract HIV in individuals infected with *T. vaginalis,* with a 50% increase in the chance (MASHA *et al.,* 2019). This fact is due to

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several mechanisms of action of the protozoan, such as degradation to the epithelial membrane - which provides a first-line defense mechanism against HIV - through cell adhesion, hemolysis and excretion of soluble factors. In addition, co-infection of T. vaginalis with HIV can increase the elimination of the virus through the genital and possible reinfection (MASHA *et al.,* 2019; KISSINGER et al., 2013).

There is also the inflammatory action caused by the protozoan through the activation of the NLRP3 inflammasome. (MASHA et al., 2019; HUANG et al, 2025). According to the study by Huang et al., 2025, cell adhesion and inflammation result from the release of extracellular vesicles (EVs) that activate cytokines - such as IL-6, IL-8 - which generate the overexpression of TLR3, MICB, and TRAF3IP2. In addition, EVs can cause the death of macrophages by apotheosis through the phosphorylation of p38 MAPK. (HUANG *et al.,* 2025). In addition to extracellular vesicles, other factors can promote the adhesion of *T. vaginalis*, such as lipoglycan, surface proteins (TvBAP-1 and TvBAP-2, whose mechanisms have not yet been properly elucidated), TvPP1Y, TvLegu1 and TVROM1 enzymes, and the modulation of the vaginal microbiota, which inhibits the growth of lactobacilli, (MERCER & JOHNSON, 2018).

Much more than these adhesion factors that mediate the communication between the protozoan and the host cells, *T. vaginalis* harbors the Trichomonas vaginalis virus, a double-stranded RNA virus whose strains of types I to IV may be closely linked to the pathogenesis of the protozoan (Fichorova *et al., 2017;* MERCER & JOHNSON, 2018). It is suggested that T. vaginalis that have the virus inside them have greater adherence to host cells, as these induce greater release of inflammatory cytokines that are recognized by TLR3 compared to T. vaginalis that do not have the virus (MERCER & JOHNSON, 2018). As for treatment, few studies suggest a relationship between the presence of the virus and resistance to metronidazole classes, and more research is needed to elucidate this issue (GRAVES *et al.,* 2025).

The high proportion of asymptomatic infections by *T. vaginalis* represents one of the main challenges for the effective control of trichomoniasis and for the protection of women's health. It is estimated that up to 85% of infected women may not have symptoms at the time of diagnosis, which favors underdiagnosis, persistence of infection, and continuous transmission of the parasite (Kissinger *et al*., 2022; Mabaso *et al*., 2021). In this scenario, the exclusive dependence on the syndromic approach limits the early identification of the disease, especially in primary care settings, where more sensitive

diagnostic methods are not always available. Silent infection, when unrecognized, can progress to chronic inflammatory processes, increase the risk of sexually transmitted co-infections, including HIV, and contribute to adverse reproductive outcomes, reinforcing the need for broader and more sensitive diagnostic strategies in the clinical management of female trichomoniasis (Kissinger *et al*., 2022; Cenkowski *et al*., 2022).

The gold standard treatment for *T. vaginalis* is metronidazole, a mandatory intracellular antibiotic developed in the 1960s and one of the only ones that has shown real efficacy against the parasite, and is also the most financially viable and most tolerated among patients (BOUCHEMAL *et al.,* 2017). However, some side effects, such as gastrointestinal problems, have been reported, especially in cases of resistance and recurrence in which the dosage of metronidazole tends to be higher, which leads many patients to interrupt treatment (BOUCHEMAL *et al.,* 2017). The mechanism of action of metronidazole has not been fully elucidated, but it is known that it penetrates the cell membrane of bacteria - and T. vaginalis - by diffusion and causes DNA degradation, leading to cell death (SHAHZAD *et al.,* 2025). It is a drug that belongs to the B risk classification for pregnant women and can reach breast milk - although it does not harm the fetus - as well as cross the blood-brain barrier, but rarely causes neurological damage (SHAHZAD *et al.,* 2025).In addition, a high rate of resistance to the use of Metronidazole is estimated, studies indicate that 1 in 10 cases treated for T. Vaginalis may present resistance. Another study tested women with infections refractory to treatment, which indicated that 66% of them had some level of resistance to metronidazole. However, culture and susceptibility testing can be considered in patients who maintain a positive test after treatment and if resistance is confirmed, other therapeutic options such as Tinidazole can be used. (Cenkowski *et al*., 2022; Van Gerwen et al., 2021).

The approach to pregnant women requires particular attention; treatment with metronidazole is considered safe in all trimesters of pregnancy and is critical to mitigate risks of premature rupture of membranes and prematurity (Cenkowski et al., 2023). However, the impact of treating asymptomatic infections on the prevention of neonatal outcomes is still the subject of academic debate, requiring shared clinical decision-making. The management of nitroimidazole resistance, although less common than in other pathologies, should be suspected in cases of persistent failure after adequate treatment of partners, requiring high doses of tinidazole or alternative regimens under expert supervision (Van Gerwen et al., 2021).

Another critical pillar is Expedited Partner Therapy (EPT), as failure to treat sexual partners is the most common cause of infection recurrence in women (Kissinger et al., 2022). Male trichomoniasis is an indirect but central determinant for the persistence of the infection and for the adverse impacts on women's health, since men infected with *Trichomonas vaginalis* are often asymptomatic and, therefore, remain undiagnosed and untreated, acting as silent reservoirs of the parasite. Evidence indicates that up to 72% of male sexual partners of women with trichomoniasis are also infected, which contributes significantly to the high rates of female reinfection, even after appropriate treatment (Van Gerwen *et al*., 2021; Kissinger *et al*., 2022). Still in this sense, concomitant treatment of sexual partners is often neglected by doctors and is a common cause of reinfection (Cenkowski *et al*., 2022). Although male infection may resolve spontaneously in some cases, this process occurs unpredictably and in variable time windows, allowing transmission to be maintained for prolonged periods (Van Gerwen *et al*., 2021). In this context, the absence of systematic screening and treatment strategies in men reinforces women's vulnerability to recurrent infection, gynecological complications, and increased risk of HIV acquisition. Thus, the effective clinical management of female trichomoniasis depends, inseparably, on the concomitant therapeutic approach of sexual partners, consolidating Expeditious Partner Therapy as a fundamental intervention for the protection of women's health and for the interruption of the chain of transmission (Kissinger *et al*., 2022; Cenkowski *et al*., 2022).

From the point of view of women's health, trichomoniasis should be understood as a condition that goes beyond the isolated infectious condition, since its repercussions involve gynecological, obstetric and epidemiological aspects. The persistence of infection is associated with chronic inflammatory processes of the lower genital tract, which can favor the emergence of other vulvovaginitis and increase susceptibility to sexually transmitted infections, including HIV, aggravating existing inequalities in access to sexual and reproductive health (KISSINGER et al., 2020; VAN GERWEN et al., 2021).

In addition, the occurrence of trichomoniasis during pregnancy requires expanded clinical attention, considering the physiological and immunological changes typical of this period. Evidence indicates that infection is associated with unfavorable obstetric outcomes, such as preterm birth, premature rupture of membranes, and low birth weight, reinforcing the importance of timely screening and appropriate therapeutic approach in prenatal care (CENKOWSKI et al., 2023; WORKOWSKI et al., 2021). In this context,

treatment should not be interpreted only as an individual curative measure, but as a preventive strategy aimed at reducing maternal and neonatal risks.

In addition, the effectiveness of the clinical management of female trichomoniasis is directly related to adherence to treatment and the proper management of sexual partners. The lack of concomitant approach by partners is a determining factor for reinfection and maintenance of the transmission chain, compromising therapeutic results in the medium and long term (VAN GERWEN et al., 2021; KISSINGER et al., 2022). Thus, integrated strategies that combine effective pharmacological treatment, sexual health education and systematic clinical follow-up are essential for reducing the burden of the disease and promoting women's health.

4 CONCLUSION

Trichomoniasis is an STI of high relevance for women's health, whose impacts transcend the acute infectious condition. The infection promotes persistent changes in the vaginal microbiota — with the suppression of *Lactobacillus* sp. — and triggers inflammatory cascades mediated by the NLRP3 inflammasome and extracellular vesicles, which enhances female vulnerability to other pathogens, especially HIV.

The analysis of the evidence reinforces that the transition to the multi-day therapeutic regimen with metronidazole and the adoption of NAAT as the diagnostic gold standard are fundamental steps to reduce the high rates of reinfection and persistence of the parasite observed with single doses.

In the field of public health, the clinical approach must be comprehensive and proactive:

- **Pregnant women:** Safe treatment in all trimesters to prevent prematurity and low birth weight.
- **Partners:** Implementation of Expedited Partner Therapy (EPT) to mitigate male underdiagnosis and silent reinfection.
- **Screening:** Annual screening in high-risk populations (e.g., HIV+ women) due to the high rate of asymptomatic women.

It is concluded that the management of trichomoniasis should be a priority strategy for sexual and reproductive health. Strengthening surveillance against nitroimidazole resistance and health education are essential to reduce the diagnostic gap and ensure the integrity of women's gynecological and obstetric health.

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