



Neonatal Conjunctivitis Caused by *Trichomonas Vaginalis*, A Systematic Review

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ABSTRACT

Introduction: Amongst sexually transmitted infections in the world, *Trichomonas vaginalis* is of the most common. Most of the infections are asymptomatic. It can infect women more than men because of genital tracts condition. The mother's birth canal and perineum are common sources of infants' eye infection. Some studies noted the possibility of *T. vaginalis* transmission through the birth canal to infants. Such an event can lead to neonatal conjunctivitis. By following Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines, a systematic review conducted to assess the possibility of neonatal conjunctivitis caused by *T. vaginalis*. Several factors can play a role in *T. vaginalis* transmission, such as low sanitary level, physical contact by contaminated biological fluids and infant's opened eyes during the delivery. Through the review of different studies, it is inferred, although the probability of neonatal conjunctivitis caused by *T. vaginalis* is low, but it is possible. Finally, metronidazole is an approved drug for treatment of trichomoniasis and needs to consider in neonatal conjunctivitis caused by *T. vaginalis*.

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Introduction

Trichomonas vaginalis, causing trichomoniasis, is a highly contagious protozoan parasite that infects the urogenital tracts (1). Trichomoniasis is one of the most common sexually transmitted infections worldwide and according to the World Health Organization (WHO) notifications, the global prevalence of trichomoniasis is higher than the prevalence of *Neisseria gonorrhoeae*, syphilis and chlamydial infection (2). The 153 million estimated new cases of trichomoniasis worldwide per year, making it the most common non-viral sexually transmitted disease

in the world (1). *T. vaginalis* can infect both genders of human; however, trichomoniasis is more common in women than men (3). Most infections are asymptomatic (4). *T. vaginalis* may have adverse consequences in pregnant women such as premature labor, increased susceptibility to cervical cancer, miscarriage and low birth weight infants (5). There is an important question; is *T. vaginalis* more prevalent in pregnant women than non-pregnant women at the same age- class? Some studies claim it (6). Eye diseases that are caused exclusively by ocular

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contamination with genital discharge from local genital infections, such as lymphogranuloma venereum ‘swimming pool conjunctivitis and conjunctivitis of the newborn are classified as Oculo-genital diseases (6). Nearly all sexually transmitted diseases (STD) can cause ocular disorders (such as Syphilis, gonococcal and Chlamydial infection, *Herpes simplex virus (HSV)*, *human papilloma virus (HPV)*, *Molluscum contagiosum* and *T. vaginalis*) (7). Some studies suggest that maternal *T. vaginalis* infection can lead to conjunctivitis in the newborn (7). When a healthy conjunctiva comes in contact with vaginal secretions containing *T. vaginalis* parasites, leading to conjunctival infection with symptoms such as conjunctival inflammation and a yellow, purulent discharge from both eyes (8). The most common source of eye infection in infants is mother’s birth canal and perineum (7). Infection occurs only if infant’s eyes are open during passing through the birth canal or the infant eyelids are not properly cleaned after birth (5). Also, infections of the infant’s conjunctiva or cornea prior to birth may due to an intrauterine infection, but it is extremely rare (9). Information on the occurrence of the Conjunctivitis caused by *T. vaginalis* in infants is narrow. Better understanding of the association *T. vaginalis* and infant’s conjunctivitis provide insights on conjunctivitis that may be attributed to *T. vaginalis* (1). The aim of this systematic review was to evaluate the incidence of neonatal conjunctivitis caused by *T. vaginalis* in terms of its frequency and transmission mechanism.

Materials and methods

We followed the Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines, using a prior defined protocol.

Search strategy

In order to access related articles, medical databases including PubMed, Scopus, Science direct, and SID as well as Google Scholar database were searched. The combination of all the following search terms (*Trichomonas vaginalis*, *T. vaginalis* and trichomoniasis) with all the following search terms (Oculo-genital, conjunctival infection, Conjunctivitis, infants and newborn) were used. All articles that were published till May 2021 were included in the review.

Eligibility criteria

Inclusion criteria included original articles, case-reports and review studies that reported both *T. vaginalis* infection and infant

conjunctivitis, written in English or Persian language. No restrictions were in terms of study design. Infection with *T. vaginalis* was defined as the presence of the pathogen which assessed by culture, wet mount or molecular methods, while infant conjunctivitis was defined by signs such as yellow and purulent discharge (5). Exclusion criteria were unavailability of the full text article, systematic reviews, and narrative-only conference abstracts, multiple reports of the same data, non-scientific diagnostic methods and in vitro and animal studies.

Data extraction

Using all mentioned terms, the research was conducted for relevant papers in databases. 245 papers were collected, including 29 articles from PubMed, 32 articles from Science direct, 42 articles from Scopus, and 142 articles from Google scholar. All the articles were imported into EndNote X8 and duplicates were removed.

Results

Finally, 35 studies were removed due to were duplicated; we selected 210 abstracts for full-text evaluation (Figure 1). There were 4 studies (two original articles and one systematic review and one case report) with our inclusion criteria to be included in our systematic review. The most important inclusion criteria were the simultaneous presence of trichomoniasis and infant conjunctivitis. The following information was collected: authors, year of publication, country where the study had been carried out, study design, study population, *T. vaginalis* detection method, conjunctivitis detection method and findings; all data are mentioned in Table 1.

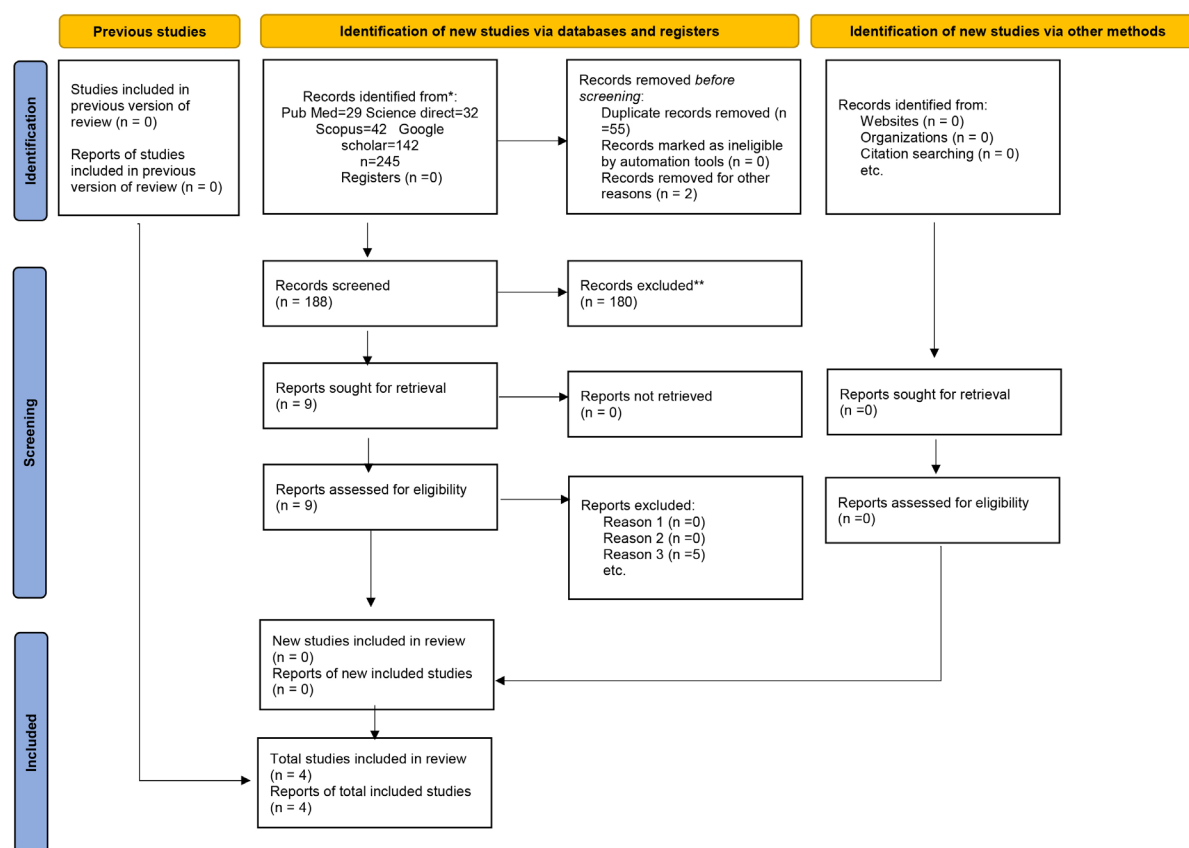
Original studies

In the study conducted by NORN et al. it is mentioned unlikely pathogenic role of *T. vaginalis* in the eye region. The samples were analyzed by phase-contrast microscopy and culture on diamond’s medium. There was no case of infant conjunctivitis with *T. vaginalis* (6).

In contrast to the findings of this study, an original study in 2012 on pregnant mothers, found that maternal *T. vaginalis* infection was associated with increased risk of the infant’s conjunctivitis (P. value<0.05). The diagnostic method was wet-mount analysis of vaginal swabs by light microscopy and culture on CPLM (Cysteine Peptone Liver Maltose Medium) selective medium (5).

Case report study

Another study in 2013 reported a 32-year-



Digram 1: PRISMA 2020 flow diagram for updated systematic reviews which included searches of databases, registers and other sources

old man with a two weeks history of inflamed conjunctiva and yellow purulent discharge from both eyes. Bacterial and viral culture were negative. According to the initial diagnosis by Gram-stained smear, it confirmed through culture on Kupferberg medium and specific PCR (Polymerase Chain Reaction). Both diagnostic tests confirmed the presence of *T. vaginalis* in the patient's conjunctiva. The patient was treated with metronidazole. The patient noted his eyes had recently been contaminated by sexual discharge of his sexual partner. This study supports the idea that direct physical contact is required for transmission of *T. vaginalis* and probability of *T. vaginalis* conjunctivitis is very low, but it is possible (1).

Review study

A review study, in 2018, noted exposure of healthy conjunctiva to vaginal secretions containing *T. vaginalis* parasites leads to conjunctival infection. *T. vaginalis* was one of the etiological agents exploring by the study (8).

Discussion

Neonatal conjunctivitis, also called ophthalmia neonatorum, is one of the common infections in

the first month of a neonatal's life (10). It can be associated with potentially serious and long-term complications and is therefore considered a major public health problem (11). Neonatal conjunctivitis is associated with different factors, including trauma throughout the medical interventions, horizontal transmission of pathogens in hospital neonatal units such as NICU (neonatal intensive care unit), and sometimes affected pregnant mothers by sexually transmitted infections while passing through the birth canal (12). The most common source of eye infection in infants is the mother's birth canal and perineum (9). Therefore, sexually transmitted diseases can play an important role in the development of conjunctivitis in infants. Along with other factors such as *N. gonorrhoeae*, *C. trachomatis*, HSV, Streptococci and *Staphylococcus aureus*, *T. vaginalis* is one of the STD agents worldwide (13). The prevalence of trichomoniasis in the world is higher than the prevalence of gonorrhea, syphilis and chlamydial infections (2). One of the first studies to investigate the role of *T. vaginalis* in conjunctivitis in infants and adults was done by NORN et al. (6). According to a case report study, which reported *T. vaginalis* conjunctivitis

Table 1: Information collected from studies

Author (Year)	Setting	Study design	studied population	detection method	Conjunctivitis detection method	Finding
Abdolrasouli et al (2013)	Iran	CASE REPORT	32-year-old Iranian man	PCR	Signs and symptoms: inflamed conjunctivae and a yellowish, purulent discharge emanating from both eyes	Identification <i>T. vaginalis</i> in conjunctival swabs
Alwadani et al (2018)	Saudi Arabia	Review article				Exposure of the healthy conjunctiva to vaginal secretions harboring <i>T. vaginalis</i> parasites leads to conjunctival infection
Eucharía Chinyere et al (2012)	Nigeria	Original article	688 pregnant women and Their infants	preparation Wet mount from vaginal swab samples and viewed with the light microscope to observe motile form of <i>T. vaginalis</i> . Cultivate positive sample in selective medium - Cysteine Peptone Liver Maltose Medium (CPLM)	Data for neonatal conjunctivitis was obtained from the doctors after delivery and at 6 weeks post-natal visit	A total of 89(12.9%) of the women were found to be infected by <i>T. vaginalis</i> , 31(18.85%) the infant born of infected women were infected with conjunctivitis <i>T. vaginalis</i> infection was statistically found to be associated with infants infected with conjunctivitis (P.value<0.05)
NORN et al (1976)	Denmark	Original article	Series A: 122 patients with external eye disease (55 women and 67 men) Series B: 272 newborns	phase-contrast microscopy, culture on Diamond's medium		<i>Trichomonas vaginalis</i> was observed in 3.7% of maternal vaginal swab, not a single case of <i>Trichomonas vaginalis</i> was detected in the conjunctiva in neither group. no significant association between maternal trichomonas vaginalis and infants with conjunctivitis

in a 32-year-old man, the probability of *T. vaginalis* conjunctivitis can be concluded (1). Metronidazole has been the only approved drug for the treatment of trichomoniasis in most parts of the world since 1961 (14). The small number of pregnant women infected with *T. vaginalis* (n = 10) in an investigation; it may explain the contradiction in results in other studies (15). Confirmation method is important through the studies. Some pregnant women may miss due

to false negative results 16)). Additionally, to achieve more accurate results, a larger number of cases must be assessed in studies (17).

Conclusion

The probability of *T. vaginalis* conjunctivitis is very low, but some studies reported infected cases; so, in health care centers, before and during pregnancy, women should be examined for *T. vaginalis* infection. Metronidazole should

also be considered as a treatment option in infants with conjunctivitis.

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