SHORT REPORT

Low positivity rate after systematic screening for *Trichomonas vaginalis* in three patient cohorts from general practitioners, STI clinic and a national population-based chlamydia screening study

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ABSTRACT

Objective The goal of this multi-cohort study is to investigate the positivity rate of *Trichomonas vaginalis* (TV) among three distinct Dutch patient populations and its relation with *Chlamydia trachomatis* (CT) positivity. Few studies have been performed in Europe where TV positivity rate seems to be low. Additionally, the majority of earlier studies have focused on high risk or specific populations.

Methods A random selection of men and women from a national population-based chlamydia screening, attendees of a sexually transmitted infections (STI) clinic and a non-selected population from general practitioners (GPs) were systematically screened for TV and CT using PCR. The associations among TV and CT co-infection, age and gender were studied.

Results A total of 2079 individuals were studied. A TV positivity rate of 1.5% was observed in the medium risk GP cohort followed by 0.7% in the low risk population-based cohort and 0.6% in the high risk STI clinic. TV was found in 0.7% of CT positives and a similar 1.1% among CT negatives. All TV positive individuals in this study were women.

Conclusions The positivity rate of TV was low (<2%) and comparable in all three populations studied. We found no association between TV and CT infection.

INTRODUCTION

Among sexually transmitted infections (STIs), *Trichomonas vaginalis* (TV) is the most common non-viral STI worldwide.[1] Trichomoniasis can cause symptoms ranging from mild irritation to severe inflammation. However, approximately 50% of infected people remain asymptomatic.[2] TV remains an under-recognised and underdiagnosed infection while it could facilitate HIV transmission.[3] The introduction of (real-time) PCR tests allows for high-throughput sensitive detection of TV, yet only a limited number of studies focused on TV prevalence. In addition, the majority of these studies focused on high risk or specific populations and few studies have been performed in Europe where prevalence rates seem to be low.[4] In this study, three distinct Dutch patient populations were included and screened for TV using PCR. Our objective was to compare systematic positivity rates of TV and its relation with *Chlamydia trachomatis* (CT) in patient populations from general practitioners (GPs), an STI clinic and a population-based chlamydia screening cohort.

METHODS

A total of 2079 participants were included between 2008 and 2012 from three distinct cohorts. The first cohort consisted of samples from the Dutch Chlamydia Screening Intervention (CSI) study, a population-based Chlamydia screening among 15–29-year-olds in three regions in the Netherlands. This cohort represents a low risk population with a response rate of 16% among the young general population (CT positivity rate of 4%). The second cohort was a random selection of samples from the STI-clinic South Limburg representing high risk visitors of STI clinics (CT positivity rate of 12%). Finally, a random selection of samples obtained from GPs in South Limburg was included. These represent a medium risk population (CT positivity rate of 8%). An additional selection of CT positive samples from the CSI study and the STI clinic were added to the cohort samples to study TV and CT co-infection. Next, samples were divided into either CT positive or negative and the number of TV cases in each group were studied.

All samples included, either urine or vaginal swabs, were submitted to the medical microbiology laboratory for CT and TV testing. For all cohorts, data on age and gender of included patients were collected. The study was approved by the Medical Ethics Committee of Maastricht University. All samples from the STI-clinic and GPs were tested for the presence of CT with the Cobas 4800 (Roche Diagnostics, Basel, Switzerland). Samples from CSI were previously tested for CT within local laboratories by three different PCR assays (BD Probetec, Genprobe Tigris, and Roche Cobas Taqman PCR) according to manufacturer's protocol. Testing always included the use of an inhibition and amplification control. For TV testing, total nucleic acids from 200 μL of urine or resuspended swab samples were isolated using the QIAamp DNA Mini-kit (Qiagen) according to the manufacturer's instructions. The presence of TV was investigated by a Taqman real-time PCR analysis as described previously.[2] The assay had a lower limit of detection of 50 TV copies/PCR and was earlier described to have a clinical sensitivity and specificity of 100% and 99%.[2]

Table 1 Demographic characteristics of study population and *Trichomonas vaginalis* positivity rate among three patients cohorts

	STI cohort (n=464)	CSI cohort (n=566)	GP cohort (n=602)
Women (%) of total	52% (243)	84% (473)	92% (554)
Mean age (years)±STD	29±11	27±4	31±11
Chlamydia trachomatis positivity rate	12.0% (50) (8.27%–13.93%)	3.7% (21) (2.44%–5.60%)	8.3% (50) (6.36%–10.79%)
T vaginalis positivity rate	0.6% (3)	0.7% (4)	1.5% (9)
Overall	(0.22%–1.89%)	(0.27%–1.78%)	(0.79%–2.82%)
In women	1.2% (0.42%–3.86%)	0.8% (0.33%–2.16%)	1.6% (0.85%–3.05%)

CSI, Chlamydia Screening Intervention; GP, general practitioner; STI, sexually transmitted infection.

RESULTS

A selection of 1632 patients were included in this study to assess differences in TV positivity rates among three different populations (table 1). A random selection of 566 patients from the CSI cohort and 464 patients from the STI clinic were compared with 602 samples retrospectively obtained from the GPs. The TV positivity rate was low, with a TV positivity observed of 1.5% (n=9) within the GP cohort, 0.7% (n=4) found in the CSI cohort and 0.6% (n=3) in the STI cohort.

The TV detection rate was lower compared with the CT detection rate in all three cohorts. Furthermore, the high risk STI clinic with the highest CT positivity (12.0%) showed a low TV positivity rate (0.6%). Co-infection positivity of TV and CT was assessed in patients obtained from the three study populations (n=1632) supplied with the additional CT positive patients (n=237 CSI study, n=210 STI clinic). Co-infection of CT positivity (n=571) and TV positivity was noted in four patients (0.7% (0.27%–1.79%)) compared with 16 TV positive cases (1.1% (0.65%–1.72%)) among the CT negative patients (n=1508).

Regarding age in the original three study populations, TV positivity was 0.9% (0.25%–3.34%) in patients aged <21 years (n=214), 0.8% (0.37%–1.58%) in patients aged 21–30 (n=906), 1.0% (0.33%–2.85%) in patients aged 31–40 (n=305) and 1.9% (0.75%–4.84%) in patients aged >40 (n=208). In contrast, CT showed a significantly higher positivity ($p<0.05$) at younger age: 15.9% (11.6%–21.38%) age <21 years. CT positivity rate was 8.4% (6.76%–10.38%) in patients aged 21–30, 2.6% (1.33%–5.09%) in patients aged 31–40 and 2.9% (1.33%–6.14%) in patients aged >40 years. Finally, TV positivity within the three different cohorts was compared between male (n=362) and female patients (n=1270) and all TV positive patients were found to be female. Also, comparable TV positivity rates in women between the three populations were found (table 1).

DISCUSSION

This study demonstrated a similarly low TV detection rate in all three study cohorts analysed. The strengths of this study include a large study population including both women and men, and the systematic screening of three different patient cohorts comparing a high risk (STI clinic) and medium risk (GP cohort) population with a cohort from a national population-based chlamydia screening study (CSI cohort). Our results show that in all three cohorts, TV detection rates are lower than rates reported in, for example, the USA[5 6] and similar to reports in Northern Europe for GP/STI clinic populations and population-based screenings.[2 4]

In all three cohorts, the CT positivity rate was in agreement with previously published data.[7 8] CT positive samples were included to study the co-infection rate of CT and TV. The positivity of TV was similar in CT positive samples as compared with CT negative samples. This is in contrast to a US study that reported co-infection for CT and TV although prevalence rates were low.[9] While TV detection showed no association with age, CT detection peaked at young age. Our CT data confirm previous findings[5] while for TV an association with increasing age was reported previously.[4 6] A weakness of our study is that although a low TV positivity rate is demonstrated for the Netherlands, the TV numbers obtained were insufficient to demonstrate firm associations.

Finally, all our TV positive patients were women. This is most likely due to limited male participation, particularly within the GP cohort, as well as a low TV positivity in men which was previously reported to be lower than in women.[2 10] In the GP cohort, the percentage of male patients was <10%, which is a reflection of the testing behaviour of GPs, yet it is higher than previously reported by Schirm *et al*[2] who included <5% male participants in a similar Dutch cohort. Finally, previous studies have reported conflicting data regarding the sensitivity of male urine samples for TV testing.[11 12] Therefore, the use of urine could potentially bias the male TV results.

In conclusion, TV positivity rates were low (<2%) and comparable in all three patient cohorts despite differences in sexual risk behaviour.

Key messages

- Low positivity rate of *Trichomonas vaginalis* (TV) in three distinct patient populations: general practitioners (1.5%), STI clinic (0.6%) and population-based chlamydia screening cohort (0.7%).
- All TV positives samples were women.

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Contributors TG and AD wrote the manuscript. PW was responsible for TV testing. TG, CH and PW interpreted the data and CH, JvB and ND were responsible for the design of the study. All authors contributed to and approved the final draft of the manuscript.

Competing interests None.

Ethics approval Medical Ethics Committee of Maastricht University.

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