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Prevalence and Risk Factors of Vaginal Trichomoniasis in Women: Study at the University Hospital of Pikine in the Suburbs of Dakar, Senegal

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Abstract

Introduction: This study aimed to investigate the epidemiology of genital trichomoniasis in Senegal. It sought to determine the prevalence and risk factors associated with this condition in Senegal. **Methodology:** The study took place at the university hospital of Pikine in the suburbs of Dakar. For each of the women recruited, socio-demographic data, clinical examination data and the results of direct examination of the vaginal sample were collected in a questionnaire designed for this purpose. **Results:** A total of 312 women with a mean age of 31.13 (±8.41) years were recruited in this study. The majority of these women (59.94%; 95% CI = 54.25 - 65.38), were seen for an infectious diseases assessment. Leucorrhea (58.33%; 95% CI = 52.63 - 63.83) and genital discharge on vaginal touch (99.36%; 95% CI = 97.45 - 99.89) were the predominant signs on clinical examination. The overall prevalence of vaginal trichomoniasis after direct examination of the specimens was 1.28% (95% CI = 0.41 - 3.47). Only the distribution of this prevalence by occupation was statistically significant (p = 0.0004). **Conclusion:** The low prevalence of genital trichomoniasis in women and the risk factors associated with it found in this study, which took place about ten years ago, should prompt an update of the data to better define the problem in Senegal.

Keywords

Vaginal Trichomoniasis, Prevalence, Risk Factors, Dakar Suburb, Senegal

1. Background

Genital trichomoniasis is a Sexually Transmitted Infection (STI) caused by a protozoan called *Trichomonas vaginalis*. The disease is asymptomatic in 15% - 20% of cases and when symptomatic, it most often manifests as irritation secondary to genital pruritus and discharge, and sometimes urinary symptoms [1] [2]. It is also the most common non-viral STI in the world, with 156 million new infections annually worldwide [3] [4]. Genital trichomoniasis is therefore a public health problem in the sense that it is a major source of reproductive morbidity and a facilitator of HIV transmission and acquisition [5]. Despite its importance in human reproductive health and HIV transmission, it is not a notifiable disease and surveillance is generally not undertaken. This could probably explain its global prevalence of around 1% to 8% depending on gender and which also varied according to the geographical region [5]. Female prevalence, the most affected population, was estimated at 2.8% - 3.1% in North America [6]; at around 3.5% in Tunisia in 2015 [4] and at 4.8% in Senegal between 2006 and 2011 [7]. This low prevalence may also be related to the fact that in areas where access to complementary examinations is not always possible, the management of genital infections is generally based on a syndromic approach taking into account the epidemiological and clinical aspects of the disease, but also the microbiological knowledge of the practitioner [7] [8] [9] [10]. Treatment based on a syndrome approach could therefore underestimate the true prevalence of this disease.

However, it should be noted that between 2010 and 2019, the incidence of trichomoniasis increased by 0.27%, and the estimated increase per year was highest in sub-Saharan Africa and East Asia [11].

For physiological, socio-cultural and socio-economic reasons, women are the main victims. Indeed, the symptomatology induced by *Trichomonas vaginilis* is one of the most frequent reasons for consultation in gynecology (approximately 90% of women are affected) [7] [8]. They can cause serious complications in women, in particular premature delivery, early rupture of membranes in pregnant women, low birth weight in newborns, infertility and cervical cancer [7] [12]. This situation should therefore prompt special attention to be paid in order to prevent these complications. This will require regular surveillance and early biological diagnosis for appropriate treatment. In Senegal, this work is being carried out, but this evaluation of the burden of vaginal trichomoniasis has mostly been carried out in urban hospital structures.

This study was therefore initiated to continue the monitoring of this condition in Senegal. The aim was to determine the prevalence of vaginal trichomoniasis in a hospital in the suburbs of Dakar.

2. Methodology

- **Type, period and site of study**

This is a prospective and descriptive study that was conducted between September and December 2014 at the laboratory of Pikine Hospital in Senegal. The choice of this university hospital was motivated by its location in the suburbs of Dakar, but also by the fact that the majority of studies on urogenital trichomoniasis in Senegal have been conducted in urban hospital structures [1]. This hospital has a laboratory for biological analyses, composed of parasitology-mycology, bacteriology, hematology, immunology and biochemistry departments.

- **Study population**

The study population consisted of women for whom a biological examination of a vaginal swab was requested and performed at the parasitology bench of our study site laboratory. Women who came to the laboratory for biological analysis of a vaginal swab and gave their free and informed consent were all included in this study.

- **Conduct of the study**

A questionnaire was administered to each participant. The questionnaire was tested with women working in the laboratory. It was only after validation that it was used for the survey.

The questionnaire asked about socio-demographic characteristics, gynaeco-obstetrical history, functional and clinical signs of the patients. Another section of the questionnaire was devoted to the results of the direct microscopic examination of the vaginal swabs for *Trichomonas vaginalis*.

- **Analysis of the data**

The various data for this study were entered into a Microsoft Excel 2019, 16.60 (22041000) file (RRID: SCR_016137) and analyzed using Epi Info 7.1.3.3 (RRID: SCR_021682). Quantitative variables, such as age, were described as means with standard deviation. Categorical or qualitative variables were presented as percentages with their confidence intervals (CI). The proportions of the different groups were compared using the Chi-square test or Fisher's exact test (in univariate analysis). The significance level of the different tests was set at 5%.

- **Ethical considerations**

The opinion of the Ethics Committee of the Faculty of Medicine, Pharmacy and Ondotology at Cheikh Anta Diop University in Dakar was obtained before the study was carried out. Permission from the head of the parasitology department of the laboratory of Pikine Hospital was also obtained before to start the study. Free and informed consent was also a requirement for inclusion. In order to ensure anonymity, only the patients' initials and laboratory registry number were used for identification at the time of data analysis.

3. Results

- **Socio-demographic characteristics**

A total of 312 vaginal swabs were analyzed during the study period. They were

from women aged between 14 and 76 years with a mean age of 31.1 (± 8.4) years. The majority of these women (65.1%; 95% CI = 59.5 - 70.3) were aged between 20 and 34 years. Married women were predominant with a frequency of 92.9% (95% CI = 89.4 - 95.4) and of these 72.4% (95% CI = 66.9 - 77.5) were married in monogamy and 27.6% (95% CI = 22.5 - 33.1) in polygamy. This difference between polygamists and monogamists was statistically significant (95% CIs did not overlap). Housewives (66.7%; 95% CI = 61.1 - 71.8) predominated in our study population (Table 1).

Table 1. Distribution of 312 women according to socio-demographic characteristics.

	Frequency (N = 312)	Percentage (%)	CI (95%)
Age range			
<20 years	19	6.09	3.81 - 9.5
20 - 34 years	203	65.06	59.46 - 70.29
35 - 49 years	79	25.32	20.67 - 30.59
>50 years	11	3.53	1.86 - 6.40
Marital status			
Single	17	5.45	3.3 - 8.74
Divorced	5	1.60	0.59 - 3.91
Married	290	92.95	89.37 - 95.43
Profession			
Hotel agent	1	0.32	0.02 - 2.06
Cashier	1	0.32	0.02 - 2.06
Hairdresser	10	3.21	1.64 - 6
Shopkeeper	25	8.01	5.35 - 11.75
Accountant	3	0.96	0.25 - 3.02
Seamstress	5	1.60	0.59 - 3.91
Decorator	2	0.64	0.11 - 2.55
Pupil	17	5.45	3.3 - 8.74
Teacher	14	4.49	2.57 - 7.59
Student	14	4.49	2.57 - 7.59
Civil servant	1	0.32	0.02 - 2.06
Gendarme	1	0.32	0.02 - 2.06
Nurse	4	1.28	0.41 - 3.47
Matron	1	0.32	0.02 - 2.06
Housekeeper	208	66.67	61.1 - 71.82
Midwife	1	0.32	0.02 - 2.06
Secretary	3	0.96	0.25 - 3.02
Forwarder	1	0.32	0.02 - 2.06

- **Reasons for biological analysis of vaginal swabs**

Requesting a biological analysis of the swab were mainly infectious diseases (59.9%; 95% CI = 54.2 - 65.4), pregnancy desire (18.3%; 95% CI = 14.2 - 23.1) and pregnancy (16.3%; 95% CI = 12.5 - 21.0). Parasitological examination of the vaginal swab was also requested for a pre-operative check-up (2.9%; 95% CI = 1.4 - 5.6), a check-up (2.2%; 95% CI = 1.0 - 4.8) and finally for the assessment of sexual abuse (0.3%; 95% CI = 0.0 - 2.1) (Figure 1).

- **Patient medical data**

The information on the clinical examination of the patients showed that only 20.2% (95% CI = 16.0 - 25.1) of the women were pregnant. The functional signs presented by the patients were abdominal pain (13.8%; CI 5% = 10.3 - 18.2), vulvar pruritus (29.2%; CI 95% = 24.2 - 34.6), urinary burning (18.6%; CI 95% = 14.5 - 23.4) and leucorrhea (58.3%; CI 95% = 52.6 - 63.8). On physical examination, 34.6% (95% CI = 29.4 - 40.2) had provoked pain, 99.4% (95% CI = 97.4 - 99.9) had glove-smeared discharge on vaginal examination and 4.5% (95% CI = 2.6 - 7.6) of the women for whom biological examination of the vaginal swab was performed had an infectious cervix on speculum examination (Table 2).

- **Prevalence and distribution of vaginal trichomoniasis**

The overall prevalence of vaginal trichomoniasis in this study was 1.3% (95% CI = 0.4 - 3.5). It was only present in women aged 20 - 34 years and 35 - 49 years with respective prevalence of 1.5% (95% CI = 0.3 - 4.3) and 1.3% (95% CI = 0.0 - 6.8). However, this difference between these groups was not statistically significant (Chi-square = 0.45 → p = 0.92). This infection was only found in married women (1.4%; 95% CI = 0.4 - 3.5) especially in those who were in a monogamous regime (1.9%; 95% CI = 1.89 - 1.91). No statistical difference was noted when comparing the prevalence among married women with that of unmarried women (Chi-square = 0.3 → p = 0.85), but also when doing so for monogamists and polygamists (Fischer exact → p = 0.27). By occupation, trichomoniasis was only found among hairdressers (10.0%; 95% CI = 0.2 - 44.5), students (7.1%;

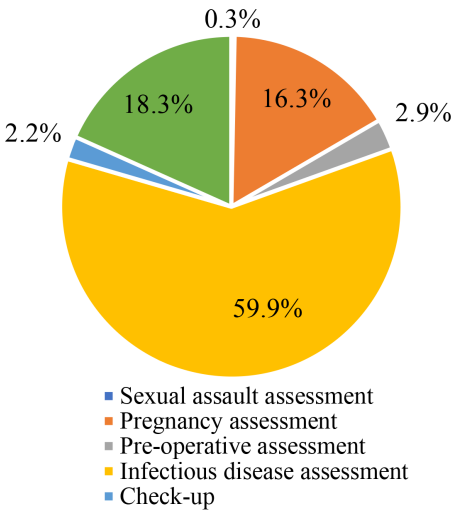

Figure 1. Reasons for requesting biological examination of vaginal swabs of 312 women.

Table 2. Clinical data of the 312 women for whom biological examination of the vaginal swab was performed.

	Frequency (N = 312)	Percentage (%)	CI (95%)
Pregnancy			
Yes	63	20.2	16.0 - 25.2
No	248	79.5	74.5 - 83.7
ND	1	0.3	0,0 - 2.1
Functional symptoms			
Abdominal pain	43	13.8	10.3 - 18.2
Vulvar pruritus	91	29.2	24.2 - 34.6
Burning of the bladder	58	18.6	14.5 - 23.4
Leucorrhoea	182	58.3	52.6 - 63.8
Physical signs			
Pain on examination	108	34.6	29.4 - 40.2
Genital discharge	310	99.4	97.4 - 99.9
Infectious cervix appearance	14	4.5	2.6 - 7.6

95% CI = 0.2 - 33.9), housewives (0.5%; 95% CI = 0.0 - 2.6) and secretaries (33.3%; 95% CI = 0.8 - 90.6). This difference in prevalence between occupations with the disease was statistically significant (Chi-square = 36.2 → p = 0.0004). Among pregnant women, the prevalence of trichomoniasis was 1.6% (95% CI = 0.0 - 8.5) compared to 1.2% (95% CI = 0.2 - 3.5) among non-pregnant women. There was no statistically significant difference between these groups (Chi-square = 0.06 → p = 0.96). The prevalence of vaginal trichomoniasis was 4.6% (95% CI = 0.6 - 15.8) among women who complained of abdominal pain compared to 0.7% (95% CI = 0.1 - 2.7) among those who did not. However, this difference was not statistically significant (Fischer exact → p = 0.09). *Trichomonas vaginalis* infection was 1.1% (95% CI = 0.0 – 6.0) among women who complained of vulvar pruritus and 1.4% (95% CI = 0.3 - 3.9) among those who did not (Fischer exact → p = 0.66). It was also present among both women with (1.7%; 95% CI = 0.0 - 9.2) and without (1.2%; 95% CI = 0.2 - 3.4) urinary burning. There was no statistically significant difference between these two groups of women (Fischer exact → p = 0.56). Biological examination of vaginal swabs revealed *T. vaginalis* among women with or without leucorrhea (1.1%; 95% CI = 0 - 2.6 vs 1.5%; 95% CI = 0 - 3.6) and pain on vaginal touch (2.8%; 95% CI = 0.6 - 7.9 vs 0.5%; 95% CI = 0.0 - 2.7). No significant difference with those who did not, as Fischer exact → p = 0.55 and Fischer exact → p = 0.12 respectively for leucorrhea and pain on vaginal touch. Parasite was found only among women with a non-infectious cervix on speculum examination (1.3%; 95% CI = 0.4 - 3.4), but also among those with soiled gloves on vaginal examination (1.3%; 95% CI = 0.4 - 3.5). There was no statistical difference between the prevalence of those with or without an infec-

tious cervix (Fischer exact → p = 0.83), and those with or without genital discharge on vaginal examination (Fischer exact → p = 0.97) (Table 3).

Table 3. Distribution of vaginal trichomoniasis according to socio-demographic and medical data.

Parameters	N° of women	N° of positives	% (95% CI)	p-value
Overall	312	4	1.3 (0.4 - 3.5)	NA
Age range				
<20 years	19	-	-	
20 - 34 years	203	3	1.5 (0.3 - 4.3)	Chi-square = 0.45 → p = 0.92
35 - 49 years	79	1	1.3 (0.0 - 6.8)	
>50 years	11	-	-	
Marital status				
Single	17	-	-	
Divorced	5	-	-	Chi-square = 0.3 → p = 0.85
Married	290	4	1.4 (0.4 - 3.5)	
Matrimonial system				
Polygamous	80	-	-	Fischer exact → p = 0.27
Monogamous	210	4	1.9 (1.89 - 1.91)	
Profession				
Hotel agent	1	-	-	
Cashier	1	-	-	
Hairdresser	10	1	10 (0.2 - 44.5)	
Shopkeeper	25	-	-	
Accountant	3	-	-	
Seamstress	5	-	-	
Decorator	2	-	-	
Pupil	17	-	-	Chi-square = 36.2 → p = 0.0004
Teacher	14	-	-	
Student	14	1	7.1 (0.2 - 33.9)	
Civil servant	1	-	-	
Gendarme	1	-	-	
Nurse	4	-	-	
Matron	1	-	-	
Housekeeper	208	1	0.5 (0.0 - 2.6)	
Midwife	1	-	-	

Continued

Secretary	3	1	33.3 (0.8 - 90.6)	
Forwarder	1	-	-	
Pregnancy				
Yes	63	1	1.6 (0.0 - 8.5)	Chi-square = 0.06 → p = 0.96
No	248	3	1.2 (0.2 - 3.5)	
ND	1	-	-	
Abdominal pain				
Yes	43	2	4.6 (0.6 - 15.8)	Fischer exact → p = 0.09
No	269	2	0.74 (0.1 - 2.7)	
Vulvar pruritus				
Yes	91	1	1.1 (0.0 - 6.0)	Fischer exact → p = 0.66
No	221	3	1.4 (0.3 - 3.9)	
Burning of the bladder				
Yes	58	1	1.7 (0.0 - 9.2)	Fischer exact → p = 0.56
No	254	3	1.2 (0.2 - 3.4)	
Leucorrhoea				
Yes	182	2	1.1 (0-2.6)	Fischer exact → p = 0.55
No	130	2	1.54 (0-3.6)	
Genital discharge				
Yes	310	4	1.3 (0.4 - 3.5)	Fischer exact → p = 0.97
No	2	-	-	
Pain on examination				
Yes	108	3	2.8 (0.6 - 7.9)	Fischer exact → p = 0.12
No	204	1	0.5 (0.0 - 2.7)	
Cervical appearance				
Infectious	14	-	-	Fischer exact → p = 0.83
Non-infectious	298	4	1.3 (0.4 – 3.4)	

4. Discussion

This study was conducted to monitor data on vaginal trichomoniasis in Senegal. It took place in a teaching hospital in the suburbs of Dakar with the aim of determining the prevalence of trichomoniasis in women who went there for biological analysis of vaginal samples. Although the study was conducted over a period of four months, it involved 312 women, most of whom were between 20 and 34 years old and married. The biological analysis of their vaginal samples was most often requested as part of an infectious disease assessment. Although

the data were collected about ten years ago, they are still of interest. The study was one of the first to be conducted in a health facility for a population living in one of the lowest socio-economic suburbs of Dakar. This study also sought to determine the risk factors of trichomoniasis and the clinical signs that may be present during the course of this condition in women, in contrast to other studies on this disease that have mostly sought to determine only the prevalence. In this study, direct examination of vaginal swabs was used for the detection of *Trichomonas vaginalis*. And it is well established that, of the available methods, at least culture and fresh wet smear microscopy are the best for the diagnosis of *Trichomonas vaginalis* [13].

The overall prevalence of vaginal trichomoniasis was 1.3% and its presence was only noted in women aged 20 - 40 years and among women in monogamous marriages. This low prevalence could be explained by the low sensitivity diagnostic technique used but also by the fact that the majority of the study population was made up of women married under the monogamy regime.

The prevalence of trichomoniasis in our study was similar to that found in a study conducted in Iran in men and women with a prevalence of 2% (95% CI, 2 ± 0.08) [13]. However, it was lower compared to that found in many studies conducted in Senegal. *Tine et al.* had a prevalence of 4.8% for 3893 women in her study between 2006 and 2011 [7]. It was also comparable to studies in Togo [14] and Burkina Faso [15] in West Africa, but also in Tunisia in North Africa (4), with respective prevalence of 6.5% (20/310); 3.2% (10/315) and 3.5% (32/924). The prevalence of *Trichomonas vaginalis* was much higher than ours in a South African study where it was 8.1% (16/198) on direct examination [10] and 20% in another study in the same country after PCR testing [16].

It was also found that vaginal trichomoniasis was only found in women aged 20 - 34 and 35 - 49 years, the age groups with the highest genital activity. These groups of women as subjects at risk have already been described in many books and studies [4] [7] [17]. An Iranian study conducted in 2015 on 481 women showed that those aged 45 - 50 and 20 - 30 years were the most affected [18]. In contrast, a predominance of this infection was noted in women aged 50 and over in a study in north-eastern Poland [19].

In our study, we also noted that parasite carriage in women could be symptomatic or asymptomatic and no statistical difference was made between these two groups. The same observation was also made in Iran between 2012 and 2013 [12]. On the other hand, another study conducted in the same country between 2015 and 2016 found a strong correlation between clinical signs and the prevalence of the disease [20].

Univariate analysis of the results of our study showed that only the professions of hairdresser, housewife, student and secretary were risk factors for the disease. However, a better assessment of the risk factors for this disease in Senegal through a more recent prospective evaluation, over a longer period of time and on a larger number of women, would make it possible to confirm or refute this finding.

5. Conclusion

This study, conducted over a short period in a hospital in the suburbs of Dakar, showed a low prevalence of vaginal trichomoniasis in women who were seen for laboratory examination of vaginal swabs. It was also noted that *Trichomonas vaginalis* can be carried in women with or without clinical manifestations and that certain professions could be linked to the carriage of the parasite. However, a study in the same context and over a longer period of time in a larger number of women would allow us to update the data and better identify the risk factors for urogenital trichomoniasis in Senegal.

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Data Availability

The data used to support the findings of the study are available from the corresponding author upon request.

Authors' Contributions

Isaac Akhénaton Manga, David Ngom and Roger Clément Tine conceived and designed the study, David Ngom and Roger Clément Tine supervised the data collection. Isaac Akhénaton Manga, David Ngom, Marie Pierre Diouf and Carole Pab Minlekib wrote the analysis plan and analyzed the data. Isaac Akhénaton Manga wrote the first draft of the manuscript. David Ngom, Marie Pierre Diouf, Carole Pab Minlekib, Souleye Lelo, Cheikh Binetou Fall, Khadime Sylla, Jean Louis Ndiaye, Magatte Ndiaye, Roger Clément Tine and Babacar Faye commented on the manuscript. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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