



Prevalence of *Trichomonas vaginalis* Infection among Female Internally Displaced Persons in Maiduguri, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author HSH designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author IEI managed the analyses and supervised the study. Both authors read and approved the final manuscript.

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ABSTRACT

This study evaluated the prevalence of *Trichomonas vaginalis* infections among females internally displaced persons (IDP) in Maiduguri, Nigeria. A cross-sectional survey of 200 women aged 11 to 45 years, from the four internally displaced persons camps conducted between July to November 2016. An informed consent of every woman was obtained before a sample of the high vaginal swab was carefully and aseptically collected using a well-labeled, sterile, non-abrasive high vaginal swab stick and was immediately inoculated into OXOID *Trichomonas* medium and incubated for 24 to 72 hours. Results show that Dalori IDP camp had the highest 26.0% and least in National Youth Service Corp 14.0% infection rates. It was found that this parasite is predominantly high in age groups 25 - 30 years with 25% prevalence, while no infection was recorded among women greater than 40 years. We observed high prevalence among married women with 21.6%. Non-formal educated women had the highest infection of 22.3%, while tertiary educated women had only 1.0%.

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Occupational related prevalence showed that traders were the most infected with 25.0% while students had the lowest infection rate of 7.1%. The study observed the highest *T. vaginalis* infection among non-pregnant women with 20.8%. It was concluded that there is 20.5% high prevalence of *T. vaginalis* infection among female internally displaced persons in Maiduguri and as such should be controlled with extensive public health education, adequate treatment of both spouses, implementation of effective screening programmes, sex education, free treatment, and awareness creation to the public, on health implication of *T. vaginalis* infection.

Keywords: *Trichomonas vaginalis*; infection; IDP camps; Maiduguri.

1. INTRODUCTION

T. vaginalis is a flagellated unicellular, anaerobic protozoan with four free flagella and one free flagellum attached to the undulated membrane, which was first observed by Donne in 1836 [1]. It is the aetiologic agent of the disease trichomoniasis that is commonly non-viral sexually transmitted infection [2,3]. Trichomoniasis is a sexually transmitted infection, which can occur in females if the normal acidity of the vagina is shifted from a healthy, semi-acidic pH (3.8-4.2) to a much lower acidic condition of (5.0-6.0) that is conducive to *T. vaginalis* growth [4]. The infection is more common in women than men, and older women are more likely to be infected than younger ones [3]. Trichomoniasis spreads predominantly through unprotected sexual intercourse with an infected partner or via the fingers after masturbation [5]. Neonatal trichomoniasis can be acquired during passage through an infected birth canal. It is estimated that 2% to 17% of female babies acquire trichomoniasis through direct vulvo vaginal contamination [6]. In women, the most commonly infected part is the lower genital tract (vulva, vagina or urethra). It is not common for the parasite to infect other parts of the body, like the hands, mouth or anus [7].

Trichomonas infection has been associated with discomfort, psychosocial distress, post abortion infection, post-caesarean, preterm birth, low birth weight infants and preterm labour; untreated infection can persist up to 5 years [8]. Other complications caused by the organism include pelvic inflammatory disease (PID) and tubal infertility, vaginitis and cervicitis [4]. Trichomoniasis is not self-limiting and produces non-ulcerative inflammation of the genital epithelium that can progress to necrosis and haemorrhage [9]. The infection is rarely reported in females before puberty or after menopause, but it is common during childbearing and culminating during pregnancy [10]. The patient clinically presents with profuse creamy-greenish-

yellowish vaginal discharge that is frothy and malodor, dysuria and itching or irritation. In some women, the infection results in burning sensation when urinating, pain during sexual intercourse or abdominal discomfort [10].

Forna and Galmezoglu asserted that 40% of pregnant women infected with *Trichomonas vaginalis* are more likely to have infants who are both preterm and of low birth weight [11]. The preterm childbirth is the leading cause of illness and death in newborn babies. However, Uneke stated that infected pregnant women have risk of an adverse birth case of premature rupture of membranes, premature labour, low birth weight, and post – abortion or post-hysterectomy infection, as well as infertility and enhanced predisposition to neoplastic transformation in cervical tissues [12]. As with other sexually transmitted infections, the trichomonas infection can also increase the risk of transmission of HIV infection [13]. *T. vaginalis* infection is one of the major health problems in the world, and one of the most commonly transmitted infections in many regions including the developed countries such as United States [14]. The prevalence rate estimated varies between populations studied falling in the range from 0.4 to 27.4% in women and 0.0 to 5.6% in men [15]. However, World Health Organization (WHO), reported that 170 million new infections occur annually throughout the world [16] and it also estimated 276.4 million new cases of trichomoniasis occurred globally in 2008 [17]. Prevalence of 15% was reported from four villages of Ekwulumili Community Anambra State, Southeastern Nigeria [18], also 10.99% prevalence of *T. vaginalis* infection among women attending antenatal in three hospitals in Maiduguri was recorded [19].

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Maiduguri the capital of Borno State and is situated at 11.85°

North latitude, 13.16° East longitude and 300 meters elevation above the sea level. Maiduguri is a very large town in Nigeria, having about 1,112,449 inhabitants. It occupies an area of 50,778 Km² (square Kilometer).

The climate of Maiduguri is favourable with a mean annual maximum temperature of 34 – 38°C, the months of March and April are known to be the hottest periods of the year with temperature ranging between 30 – 40°C. It is usually cold during harmatan period from November to January. Like many other parts of Nigeria, the area has two major seasons, the dry and the rainy season. Dry season usually last between October to May and the rainy season from June to September. The population of the state (according to the 2006 National population census) was 4 151 193 (64.37% rural populace and 35.63% urban populace) [20]. Populations of the four IDP camps visited were as follows: 22,220 in Daloro FCT, Bakasi 21,209, NYSC 5,129 and Teacher village 9,312 [20]. Maiduguri is a cosmopolitan town; all the ethnic groups of Nigeria inhabit it.

2.2 Study Population

The study was a cross-sectional survey of 200 female internally displaced persons aged above 10 years who visited internally displaced persons (IDP) clinics with or without complaints of vaginal and cervical infections and enrolled in the study. The study was conducted over a period of five months between July to November 2016. Structured questionnaire was employed to obtain relevant information from the subjects. The information obtained via questionnaire include age of subjects, pregnancy status, number of sexual partners and marital status among others.

Women within the age group who declined to give consent to participate, or who took broad-spectrum antimicrobial agents three weeks before the study and who are virgins were all excluded from the study.

2.3 Ethical Consideration

Ethical approval was obtained from State Ministry of Health Maiduguri, Borno State and permits were issued from Headquarters 7 Division Nigeria Army Maimalari Contonment, Maiduguri, National State Emergencies (NEMA) and State Emergency Management Agencies (SEMA). Informed consents were sought for from all the subjects or their parents/guidance that were willing to participate in the study.

2.4 Sample Collection

High vaginal swab samples were carefully and aseptically obtained from the posterior fornix of the vagina using a well labeled, sterile, non-abrasive high vaginal swab stick from each subject by a qualified research assistant. The tips of the other swab sticks were immediately cut off and inoculated into OXOID trichomonas media the transport media.

2.5 Laboratory Diagnoses

The specimens were inoculated into the medium immediately after collection by cutting the tip of the swab sticks into the medium, which was also gently rolled. The inoculated medium in Bijou bottles were labeled and incubated at 37°C for 24 to 72 hours. Finally, microscopic examination was done at intervals of 24, 48 and 72 hours under x10 and x40 magnification to identify the characteristic pear-shaped morphology and quick jerky or darting motility of *Trichomonads*.

2.6 Statistical Analysis

Data generated from the study were analyzed using Statistical Package for the Social Sciences (SPSS) version 20 (IBM SPSS Inc, USA). Proportions were compared using Chi-square with p-value of < 0.05 considered significant.

3. RESULTS

Of the overall 200 internally displaced women studied 41(20.5%) were infected with *T. vaginalis*, with the highest prevalence rate among women in Dalori camp having 26.0%, Teachers' village had 22.0%, while 20.0% and 14.0% were recorded Bakasi and NYSC respectively indicating no statistical significant difference among IDP camps ($\chi^2 = 2.301$; $p = 0.512$) (in Table 1).

Prevalence of *T. vaginalis* infection in relation to socio-demographic factors shown in Table 2. The highest prevalence rate was 25.0% recorded in age groups 21 - 25 years with the low prevalence rates of 11.1% on 11 – 15 years and 0.0% among women above 40 years. The prevalence rates tend to decrease in elderly women but the difference was not statistically significant with other age groups ($\chi^2 = 4.168$ $p = 0.657$). In relation to marital status, the highest infection rate was also observed among married women (21.6%), while singles and divorced women had 20.0% each and 18.6% was observed and

Table 1. Prevalence of *Trichomonas vaginalis* infections among females in four internally displaced persons' camps in Maiduguri, Nigeria

Camps	No. examined	No. positive	Prevalence (%)	χ^2	p. value
Dalori	50	13	26.0		
Teachers' village	50	11	22.0		
Bakasi	50	10	20.0	2.301	.512
NYSC	50	7	14.0		
Total	200	41	20.5		

Table 2. Prevalence of *Trichomonas vaginalis* infection in relation to socio-demographic factors in internally displaced persons' camps in Maiduguri, Nigeria

Factors	No. examined	No. positive	Prevalence (%)	χ^2	p. value
Age (years)					
11 – 15	18	2	11.1	4.168	.657
16 – 20	34	7	17.6		
21 – 25	36	9	25.0		
26 – 30	52	12	23.1		
31 – 35	30	7	23.3		
36 – 40	24	4	16.7		
≥ 41	6	0	0.0		
Marital status					
Single	40	8	20.0	.850	.997
Married	102	22	21.6		
Divorce	15	3	20.0		
Widow	43	8	18.6		
Educational level					
Primary	32	6	18.8	1.147	.765
Secondary	21	3	14.3		
Tertiary	8	1	12.5		
Non formal	139	31	22.3		
Occupation					
Civil servants	11	2	18.2	2.240	.692
Students	14	1	7.1		
Traders	32	8	25.0		
Knitters	61	14	23.0		
House wives	82	16	19.5		
Pregnancy status					
Pregnant	27	5	18.6	3.004	.539
Non pregnant	173	36	20.8		

widows. The results showed no statistically significant difference in relation to marital status. Similar difference was also in relation to educational status but the highest was among non-formal educated women with 22.3% infection rate, while 18.8% primary, 14.3% secondary and 12.5% lowest prevalence rate among tertiary educated women respectively (Table 2). The study observed 25.0% high infection rate among traders, which could be attributed to poor personal hygiene and students had the lowest infection rate of 7.1% among others. The difference in the occupational status was not statistically significant (Table 2). High prevalence rate of 20.8% was recorded among non-pregnant

women, which indicates no statistical significant difference in relationship to pregnant status ($p > 0.05$).

4. DISCUSSION

This study observed an overall prevalence of 20.5% among 200 women in four IDP camps in Maiduguri and this high prevalence of trichomoniasis could be attributed to different factors such as poor sanitary condition, low level of education, socioeconomic status, poor personal hygiene among others. On the contrary, the result is higher compared to [18] who observed a prevalence of 15% among 100

women from four villages of Ekwulumili Community Anambra State, Southeastern Nigeria. The prevalence rate observed in this study was lower than Anosike et al. who observed 24.70% among students of higher institutions in southern Nigeria [21]. The result of the study is contrary to Mairiga et al. who observed 10.99% prevalence among women attending antenatal visits in three hospitals in Maiduguri [19]. The present infection rate was above the normal range in a healthy women population and this could be attributed to environmental and socioeconomic factors.

Prevalence in relation to age was high among women aged 25 to 30 years (25%) compared to elderly women above 40 years (0.0%), which may be related to low sexual activities and also development of acquired immunity to infection with increase of age this is in agreement with [22]. The prevalence of *T. vaginalis* recorded in this study showed an increase in the reproductive age which is in agreement with [23,24].

Our study observed a high prevalence rate among non-formal educated women which is in agreement [25]. The high prevalence rate could be attributed to sexual promiscuity among the non-formal educated women. Therefore, there is the need for the provision of proper counseling and education on sexual behaviour and genital hygiene, besides treatment, to control and prevent trichomoniasis especially during pregnancy.

The prevalence of *T. vaginalis* infections among women's occupational groups in the camps showed that traders had the highest prevalence (25.0%) compared to students with 7.1%. The high infection rate observed could be due to distance between the spouses and also the reason for this outcome is somehow obscure but may be attributed to low level of toilet sanitation in camps, or no personal preventive measures. Sexual liberalism associated with wealth, poverty and ignorance, and lack of awareness of the public health repercussions may likely be the foremost in the list of risk factors [22]. The findings of our study observed equal prevalence among traders and stated that it could be attributed to their socioeconomic status [18]. We found no statistically significant difference in the frequency of trichomoniasis in relation to women marital status. Similar lack of significance was also reported in other studies [26,27]

This study revealed less *T. vaginalis* infection among pregnant women, which gives more evidence for the importance of regular clinical investigations for early diagnosis and treatment of such urino-genital infections in women as pregnant women are regularly visiting health units for routine check-up of pregnancy. However, in other studies in Nigeria for example pregnancy status did not affect the prevalence of trichomoniasis [22]. This study reported 18.6% and 20.8% prevalence of trichomoniasis among pregnant and non-pregnant women. On the contrary, Onyido et al. [18] observed 16.30% among non-pregnant women of Ekwulumili community Anambra State, Southeastern Nigeria. *T. vaginalis* infections were not detected in pregnant women while a prevalence of 16.30% was observed among non-pregnant women. Several authors have shown a greater prevalence of trichomoniasis in multiparous women, women who married at an early age and during pregnancy. This is because the growth and multiplication of *T. vaginalis* is optimal in most milieus with temperatures between 35°C and 37°C and pH between 4.9 and 7.5. Also host factors which increase vaginal pH such as pregnancy, menses and co-incident anaerobic infections in the vaginal wall, appear to encourage the development of symptomatic trichomonal vaginitis [28]. Usanga et al. [29] posited that pregnant women admitted that frequency of sexual intercourse decreases as pregnancy advances, which could be the reason for the low incidence of infection at second and third trimesters. Therefore, there is no consensus as to pregnancy predisposing the subjects to infection by *T. vaginalis*. As for infection of trichomoniasis in relation to pregnancy status, prevalence rates were less among aborted and pregnant women than among non pregnant women. However, in other studies in Nigeria pregnancy status did not affect the prevalence of trichomoniasis [22].

5. CONCLUSION

This study was concluded based on the findings that *T. vaginalis* infection among female internally displaced persons in Maiduguri, Nigeria is one of the important diseases with a high prevalence of 20.5%, and that the control of this disease is possible with extensive public health education and adequate treatment of infected people and their sexual partners. A routine vaginal swab screening of *T. vaginalis* for pregnant women in the third trimester is recommended.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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