

Prevalence of Trichomoniasis among Adults in Oru-East I.g.a, Imo State, Nigeria

Ogomaka Ijeoma A^{1*},
Nwachinemere Amara V¹ and
Obeagu Emmanuel I²

Abstract

Prevalence study on Trichomoniasis, a sexually Transmitted disease among adults male and female attending health facilities in Oru-East local Government area of Imo State was conducted between April and August, 2017. A Total of two hundred (200) high vagina swab (HVS) and urine were aseptically collected with a sterile swab stick and clean containers from female and male respectively. Of these samples collected, 100 were from females while the remaining 100 were from males. The specimen were examined macroscopically for color and odor of the discharge and urine and microscopically using wet mount preparation for characteristic tumbling motility of *Trichomonas vaginalis* under X10 and X40 objectives within an hour of collection. The overall prevalence result showed that out of 200 women and men screened, 81(40.5%) were infected and of these number, women had the highest infection of 52(52.02%) while men had the prevalence of 29(29.0%) .Clinic based result revealed that those attending general hospital Awo-omamma had the highest prevalence of 48 (48.0%) while the least was from Mbutu Health Care Centre with prevalence of 8(20.0%).The age range related prevalence revealed that those within 29-39 years had the highest prevalence of 34 (64.15%) while the least was among those within the age range of 61-72 with 5(21.74%). Educational background related prevalence showed that highest infection was recorded among those who had secondary education, 60(42.45%) while the least was recorded among those that had tertiary education. Occupational related prevalence revealed that artesian had the highest infection prevalence of 42(58.33%). The chi square analysis showed that infection did not differ significantly among the age groups ($p < 0.05$) while the mean P^H level of the vagina differ significantly among the groups, ($p < 0.05$) with age range of 29-39 having highest p^H level of 6.7. Consequently, Trichomoniasis is more prevalent among the sexually active population than the less sexually active ones hence regular and early diagnosis should be advocated to avoid obvious adverse effects to the infected individuals, their sex partners and the unborn babies.

Keywords: *Trichomoniasis*; High vagina swab; *Trichomonas vaginalis*; Sexually transmitted diseases

- 1 Department of Animal and Environmental Biology, Imo State University, Owerri, Nigeria
- 2 Department of University Health Services, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria

*Corresponding author:

Ogomaka Ijeoma A

✉ emmanuelobeagu@yahoo.com

Department of Animal and Environmental Biology, Imo State University, Owerri, Nigeria.

Tel: +2348035279375

Citation: Ijeoma AO, Amara VN, Emmanuel IO (2018) Prevalence of Trichomoniasis among Adults in Oru-East I.g.a, Imo State, Nigeria. Arch Clin Microbiol. Vol.9 No.2:79

Received: March 23, 2018; **Accepted:** March 28, 2018; **Published:** March 31, 2018

Introduction

Trichomoniasis is the most common sexually transmitted disease (STD) caused by parasitic protozoa called *Trichomonas vaginalis* [1]. It is one of the most common curable STDs that infect the urogenital tract of sexually active women and men causing significant vaginal and cervical ulceration [2-4].

This infection ranks third after bacterial vaginosis and candidiasis among the diseases that commonly cause vaginal symptom, [5,6]. *Trichomonas vaginalis*, the causative organism is highly specific

for the genitourinary tract and has been isolated from virtually all genitourinary structures including uterus. An estimated 2.5 to 3 million Americans contract this infection annually, about 25% of Nigerian students and up to 20% of pregnant women test positive while about one billion people suffer Trichomoniasis worldwide [4-6].

Infection is generally acquired through sexual contact and occasionally through nonsexual contact by getting in contact with fomites or surfaces that are contaminated by an infected individual's fluid [7]. Consequently, women especially those with

multiple sex partners easily contact this infection through sexual contact with infected men or through vulva to vulva contact while men usually contact the same infection only through sexual contact with infected women. According to Swygard [8] over 180 million women may be infected worldwide, showing a prevalence estimate which varies between population studied and ranges from 5 to 74% in women and 5 to 29% in men. In men prevalence is less well described, the reason being that men often times show less prevalence because many are asymptomatic and do not easily seek evaluation until their partner is confirmed. However, whenever symptoms occur they usually include, irritation inside the penis, mild discharge and slight burning sensation after urination or ejaculation. Women present symptoms which usually appear within 5-28 days of exposure to infection ranging from greenish- yellow frothy vaginal discharge, painful urination, vaginal itching and discomfort during intercourse in about 50% of cases to pruritus or dysuria and Pelvic Inflammatory Disease (PID) [2,7]. Genital inflammation caused by *Trichomoniasis* might also increase a woman's risk of acquiring HIV infection if she is exposed to HIV and this may increase the chances of transmitting the infection to sex partner. Most women diagnosed of *Trichomoniasis* infection are usually asymptomatic and usually avoid diagnosis. This observation is supported by a case in Zimbabwe where 75% of women denied symptoms on direct questioning but 16% of them tested positive after screening [9,10]. Misrepresentation of this *Trichomonas* infection often times seem confusing as was exemplified in a study where 74% of two hundred Nigerian women with discharge were infected with *Trichomonas* while in another study none of 149 Nigerian women with discharge were positive of the infection [8].

According to Patel, et al. [9,10] *Trichomoniasis* often times are asymptomatic in both men and women to the ratio of 50-70% which constitutes major source of transmissions of the infection. Asymptomatic nature of most infections in females adversely affects pregnancies resulting in premature birth delivery coupled with low birth weight infants that usually develop congenital health problems later in life. *Trichomoniasis* in children raises the question of sexual abuse and the possible exposure to other sexually transmitted diseases. However newborn infants can contact *Trichomoniasis* congenitally at birth [11,12].

Trichomoniasis diagnosis is commonly and mostly conducted through the examination of vaginal discharge in women and urethra fluid in men. Evaluation of P^H with p^H paper usually helps for the rapid differentiation of *T vaginalis* from yeast in women. The work of Gary [13] has it that p^H level of the vagina which is normally 4.5 is not altered during yeast infestation but may rise up to 6 and above with *Trichomoniasis*. This simply means that *Trichomonas* infection increases the P^H of the vagina.

Treatment of *T vaginalis* infection is effected with a single oral dose of 2 g of metronidazole/tinidazole. However re-infection often occur and about 1 in 5 people treated get re-infected

within three months of treatment. To this effect, it is advisable to treat all sex partners at the same time and to avoid sex until every symptom disappear [14].

The absence of baseline data in many parts of the state especially in the study area and the asymptomatic nature of the infection necessitated the investigation of the prevalence among adults in the study area.

Materials and Methods

Study area

Oru-East is among the 27 Local Government Area that made up Imo state, situated in the Northeastern part of the state and shares the same geographical locations, having both savanna and rainforest zones with the state. Majority of the indigenes are business people with few civil servants, farmers and artisans

Ethical clearance

Approval to carry out the research were obtained from the medical directors of the health services used the participants who were volunteers and from the ethical committee of infectious unity of department of animal and environmental Biology, Imo state University Owerri.

Study population

The population of study comprised two hundred adults (males& females) hundred each who were attending health facilities in the study area. The inclusion to participate was purely on voluntary basis.

Sample collection

High vagina swab (HVS) was aseptically collected from the females through the assistance of the medical laboratory scientists using sterile cotton swab stick while urine specimen were collected by the men themselves using clean sterile sample bottles as directed. The specimens were immediately taken to the diagnostic laboratory section of one of the clinics for immediate analysis within an hour after collection to avoid loss of characteristic tumbling motility of the organism and death that may follow due to loss of moisture.

Specimen analysis

The specimen were macroscopically examined by direct virtualization of the vagina discharge and urine, noting the color, odor and hydrogen ion concentration(p^H) levels of the discharge using p^H paper strip. Microscopic examination was carried out by suspending small portion of the discharge in one drop of 0.85% of physiological saline and covered with coverslip while a drop of the deposit/ sediment of centrifuged urine samples were also dropped on a clean slide and covered with coverslip. The wet mount preparations were then examined under X10and X40 objectives [8,13].

Identification of the organism

This was done based on the result obtained from examination of the clinical specimen using wet mount technique which provided sufficient number of viable organisms with their characteristic tumbling motility.

For better understanding and interpretation of the test results, simple percentages and chi-square test were used.

Results

The result of the prevalence study among adults attending health facilities in Oru-East revealed that out of 200 men and women screened for *Trichomonas vaginalis* infection, 81(40.5%) were positive. Of this number, women had the highest prevalence of 52.0% while men had the least prevalence of 29.0% (Table 1).

AwoOmma hospital recorded highest prevalence result of 48(48.%) followed by primary health care centre Omuma with 25(41.67%) prevalence while the least prevalence was observed among those that attend Mbutu health care centre and maternity having prevalence of 8(20.0%). The highest age related prevalence was obtained among the age range of 29-39 years with 34(41.5%) the least prevalence was among those of age range 60 -72,5 (21.74%), Tables 2-4 respectively. Marital status prevalence revealed that prevalence was slightly higher among the singles, (44.4%) than the married having (43.88%). Educational attainment related prevalence showed that prevalence was highest among those that had secondary education 45.45% while the least was among those with tertiary education qualification, 19.44%. Occupational related prevalence showed highest infection among traders with 58.33% (Table 6). The result of the

Table 1 Overall prevalence of *T. vaginalis* in the study Area.

Total Number Examined	Male			Female				
	Number of male Examined	Number infected (%)	Number uninfected	Number of female Examined	Number infected (%)	Number uninfected	Number infected (%)	Number uninfected (%)
200	100	81(40.5)	119(59.5)	100	29(29.0)	100	71(71.0)	52 (52.0%) 48 (48.0%)

Table 2 Age and Gender-Related Prevalence of *T. vaginalis* in Awo-Omma General Hospital.

Age Range (Years)	Total Number Examined	Gender			
		Male		Female	
		Number infected (%)	Number uninfected (%)	Number infected (%)	Number uninfected (%)
18-28	24	4 (16.67%)	2 (8.33%)	10 (41.67%)	8 (33.33%)
29-39	22	6 (27.27%)	2 (9.09%)	12 (54.55%)	2 (9.09%)
40-50	24	2 (8.33%)	8 (33.33%)	8 (33.33%)	6 (25.0%)
51-60	15	2 (13.33%)	4 (26.67%)	2 (13.33%)	7 (46.67%)
61 and above	15	1 (6.67%)	9 (60.0%)	1 (6.67%)	4 (26.67%)
Total	100	15 (15.0%)	25 (25.0%)	33 (33.0%)	27 (27.0%)

Table 3 Age and Gender-Related Prevalence of *T. vaginalis* in Primary Health Care Centre Omuma.

Age Range (Years)	Total Number Examined	Gender			
		Male		Female	
		Number infected (%)	Number uninfected (%)	Number infected (%)	Number uninfected (%)
18-28	15	2 (13.33%)	9 (60.0%)	2 (13.33%)	2 (13.33%)
29-39	15	4(26.67%)	2 (13.33%)	7 (46.67%)	2 (13.33%)
40-50	12	2 (16.67%)	4 (33.33%)	3 (25.0%)	3 (25.0%)
51-60	10	1 (10.0%)	5 (50.0%)	1 (10.0%)	3 (30.0%)
61 and above-	8	1 (12.5%)	4 (50.0%)	2 (25.0%)	1 (12.50%)
Total	60	10 (16.67%)	24 (40.0%)	15 (25.0%)	11 (18.33%)

Table 4 Age and Gender-Related Prevalence of *T. vaginalis* in Mbutu Health Care and Maternity.

Age Range (Years)	Total Number Examined	Gender			
		Male		Female	
		Number infected (%)	Number uninfected (%)	Number infected (%)	Number uninfected (%)
18-28	8	-	3 (37.5%)	1 (12.5%)	4 (50.0%)
29-39	16	2 (12.5%)	9 (56.25%)	3 (18.75%)	2 (12.5%)
40-50	16	2 (12.5%)	10 (62.5%)	-	4 (25.0%)
51-60	-	-	-	-	-
61 and above	-	-	-	-	-
Total	40	4 (10.0%)	22 (55.0%)	4 (10.0%)	10 (25.0%)

Table 5 p^H value of vagina discharge among screened women.

Age Range	Number Examined	Number Infected	Number Uninfected	p ^H Value
		(%)	(%)	
18-28	27	13 (48.15)	14 (51.85)	5.8
29-39	28	20 (71.43)	8 (28.57)	6.7
40-50	24	11 (45.83)	13 (54.17)	5.1
51-60	13	3 (23.08)	10 (76.92)	4.6
61AND ABOVE	8	3 (37.50)	5 (62.50)	4.7

Table 6 Socio-Demographic Profile of those attending the Three Various Health Care Centre's.

	Number Examined	Number infected (%)	Number uninfected (%)
Age RANGE			
18-28	47	19(40.43%)	28 (59.84%)
29-39	53	34 (64.15%)	19 (35.84%)
40-50	52	17 (32.69%)	35 (67.31%)
51-60	25	6 (24.0%)	19(76.0%)
62-72	23	5 (21.74%)	18 (78.26%)
Total	200	81 (40.5%)	119(59.5%)
Marital Status			
Single	72	32(44.4%)	40 (55.56%)
Married	98	43 (43.88%)	55 (56.12%)
Divorced	9	2 (22.22%)	7 (77.78%)
Widowed	21	4 (19.05%)	17 (80.95%)
Total	200	81 (40.5)	119 (59.5%)
Education			
Primary	32	14 (43.75%)	18 (56.25%)
Secondary	132	60 (45.45%)	72 (54.54%)
Tertiary	36	7 (19.44%)	29 (80.56%)
Total	200	81 (40.5%)	119 (59.5%)
Work Status			
Traders	72	42 (58.33%)	30 (41.67%)
Public Servant	12	4 (33.33%)	8 (66.67%)
Artisans	26	11 (42.31%)	15 (57.69%)
Unemployed	42	11 (26.19%)	31 (73.83%)
Student	48	13 (27.08%)	35 (72.92%)
Total	200	81 (40.5%)	119 (59.5%)

pH level of the female vagina showed those within the age of 29-39 having the highest value of 6.7 while the least was observed among the age range of 51-60 years,4.6 (**Tables 5 and 6**).

Discussion

Trichomoniasis is a sexually transmitted disease caused by parasitic flagellate protozoa-*Trichomonas vaginalis* that is highly site specific being associated with symptoms ranging from *T vaginitis* ,cervicitis, urethritis, pelvic inflammatory disease(PID) dysuria, prostatitis and adverse birth consequences as a result of asymptomatic nature of many of the infections in both women and in men [8,15,16]. The organism is formally considered a commensal parasite until in the 1960s when the understanding of its role as one of the sexually transmitted disease began to unfold [8]. Disease prevalence is variable and diagnosis are often difficult due the nature of the organism and the noncompliance of subject to either accept the presence of the symptoms or to submit themselves for screening perhaps for personal reasons.

This singular attitude contributes immensely to the spread and transmission of the infection as many are undiagnosed [17,18].

The prevalence of *Trichomonas vaginalis* among adult in "Oru-East L.G.A. of Imo state was studied within age range 18-72 years. Out of 200 (Two hundred) samples of urine from male and high vaginal swab (HVS) from female from the three hospital and health centres used, 81 (40.5%) were positive. The highest number of positive cases was seen in Awo-Omamma General Hospital with 48 (48.0%) cases. This was followed by Primary Health Care Omuma with 25 (41.67%) cases and least in Mbubu Health Care and maternity with 8 (20.0%). The prevalence was not in agreement with 149 (74.5%) obtained by Galandanci et al. [19] out of 200 patients examined which can be attributed to certain factors such as the rate of sexual activities in the rural areas compared to the urban areas and coupled that his work was also based on vaginal discharged only (females throughout). This present work can be compared to the work of Anosike et al. [20] who worked amongst pregnant women in Jos areas of

plateau state of Nigeria. The survey gave 37.6% for those in the metropolis while those in the rural area have 24.8%. This high prevalence in the rural area could be as a result of sexual activities and multiple sexual partners usually practiced in rural settings.

However, the prevalent rate in this present work is high when compared with the work of Arambulo et al. [21] in Phillipino among women in which 19 (6.8%) were positive out of 288 women. According to Onwuliri et al. [22], 24.7% were positive out of 505 individuals examined of *T. vaginalis* and it was appreciably higher in female than in males. He further stated that *T. vaginalis* infection had been significantly higher in females than in males in the second and third than fourth and fifth decades of life ($P < 0.05$) and also that the infection increases progressively with increase in the number of sexual partners and neglect of condom during sexual intercourse.

Nevertheless, in the present work, the highest was observed among the age range of 29-39 years with 34 (41.5%) which was followed by the age range 18-28 years with 19 (23.46%). According to Krieger [23] and Sena [24], the disease occurrence correlated with the level of sexual activity of the group of people being studied. Also, the evidence for sexual transmission of *T. vaginalis* is very strong as prevalence is highest among patients with increased sexual activities and multiple sex partners. They further stated that approximately 14-65% of male partners of infected females were also infected. The present work showed that adults within the age range of 18-28 years and 29-39 years were likely to contact the infection during sexual intercourse. This was also agreed by Tanyuksel et al. [25], who said that prostitutes were an important group for the transmission of a number of sexually transmitted disease (STDs) all over the world and infection with *T. vaginalis* as one of the most common, thus in his work using 225 prostitutes vaginal wet smear in Ankara, Turkey, 64 (25%) were positive which was high. Another study conducted by Wendel [26], showed *T. vaginalis* prevalence as 13% in men over 28 years old. Also Saxena [27] in his own work had 58% positive, out of 85 men within the age range 16-22 years in determining the prevalence of *T. vaginalis* in young men at high risk for sexually transmitted diseases. These indicated that in the present work, adults within the age range 29-39 years were supposed to have increased sexual activities and multiple sex partners which justified the result obtained. The reasons for this increase in infection among age range of 29-39 may be due to their inability to stick to their sexual partners, to avoid contact with infected articles like towels, bathtubs, clothes etc, having no control of their sexual urge. This is high when compared with findings of Woken [28] in some part of Niger Delta Region River state. This high prevalence of *trichomoniasis* may be attributed to little or no attention given to this disease of public health importance. This observation was also reported by Achalonu [29] and Petrin et al. [30]. They observed that *trichomoniasis* is the most prevalent sexually transmitted parasitic infection worldwide, yet it appears to be highly neglected.

In Nigeria, it has been reported by previous workers that sexually

transmitted disease has been blamed on increase in poverty, unemployment and violence among women and children [31,32], including other factors like sexual recklessness, lack of awareness and personal hygiene.

The gender prevalence rate was higher in females with 52(52%) cases compared to males with 29(29%) cases. This is similar to the work of Onwuliri et al. [33] who observed 374(31.0%) females and 131(15.6%) males this is possible due to the low detection of *T. vaginalis* in men using wet mount microscopy, also an optimal diagnostic method is unavailable. Moreover, there is high concentration of zinc and anti-trichomonal substances in the prostate, which affects detection [34].

Cloudiness of urine within the time of analysis indicated the presence of epithelial cells and mixed bacteria flora which indicated vaginal flora contamination brought about by Vaginalis infection in the present work but not generally observed in all the 81 (40.5%) positive cases, the presence of polymorph nuclear neutrophils, trichomonads and epithelial cells during microscopic examination of urine from male and high vaginal swab from female indicates Vaginalis infection. All the negative samples were macroscopically clear and had foul, frothy or normal odors. Although the presence of typical acute symptomatic disease was not established among the majority of adults screened, significant *T. vaginalis* was confirmed in the positive specimens.

The study of Sumadhya in Sri Lanka [35] showed that the prevalence of *T. vaginalis* infection was higher in women with low educational level than women with high educational level as it was showed in this study while Annang' study in USA [36] showed that educational status was not uniformly protective against STDs for black and white females in US. In the present study, the prevalence of *T. vaginalis* infection in low educational level of adult was higher than in high educational level. Also finding in this work in relation to occupation showed that traders have the highest prevalence of 42 (58.33%) followed by the students 13 (27.08%).

Subsequently, the prevalence rate of *T. vaginalis* among adults in Oru-East L.G.A of Imo state was high, probably due to poor sanitary condition of toilet facilities in rural areas. Other factors could be reckless sexual promiscuity among adults, wearing of dirty pants, tissue, pads, dirty towels, clothes, bathtubs and fingering during love making [7,37]. Sorvillo [38] stated that *T. vaginalis* emerging as one of the most important factors in transmission and acquisition of HIV infection. Cohen [39] and Upcroft and Upcroft [40] in their own separate studies stated that *T. vaginalis* infection was associated with preterm delivery, low birth-weight and increased in infant mortality.

They further stated that it also predisposed individuals to HIV/AIDS and cervical cancer. Cohen [41] stated that *T. vaginalis* infection in women had increased risk factor for health complications, such as infertility development of pelvic Inflammatory disease (PID); infection following gynecologic surgery and inflammatory neoplasia.

Schwebke [42] and Soper [15] also stated that in men, *T. vaginalis* had been linked to main factors in infertility as a common cause of non-gonococcal urethritis (NGU) in men. The high acidity (low p^H) of the vaginal environment (4.8) recorded among the age group 61 and above may have contributed to low infection within that age group,. This could be justified since *Trichomonas* grows best in more alkaline environment 6 and above than in the acidic environment 4.5 [13]. Consequently low p^H of the vagina environment is highly unfavorable to *Trichomonas vaginalis* survival and this agrees with high P^H level and infestation observed within age range of 18-28 and 29-39 .Therefore, the mean P^H level of the three groups differ significantly (p<0.05) among groups, is in line since infection is proportional to p^H variations of the vagina [13,43,44]. This association most probably may depend on the reproductive hormones in the older women and also on the personal health habit, access to medical care and socioeconomic status of the subjects [8,45].

References

- 1 Dune RL, Dunn LA, Upcroft P, Odoghue PJ, Uocroft JA (2003) Drug Resistance in sexually transmitted protozoan *Trichomonas vaginalis*. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 13: 52-82.
- 2 Krieger JN (2010) *Trichomonas vaginalis* and Trichomoniasis. McGraw-Hill New York 26: 587-589.
- 3 Schwebke JR, Burgess D (2004) Trichomoniasis. Clinical microbial review 17: 794-803.
- 4 World Health Organization (2001) Global prevalence and incidence of selected curable sexually transmitted infections. Overview and Estimate; Geneva 12: 156.
- 5 McClelland RS, Samgare T, Hessian MH, Lavreys L, Madaliya K, et al. (2007) Infection with *Trichomonas vaginalis* increases the risk of HIV-1 acquisition. Journal of infectious diseases 195: 698-702.
- 6 Toth MD (2013) Trichomoniasis and Infertility. Journal of infectious diseases 19: 68-70.
- 7 Nester EW, Anderson DG, Roberts CE, Pearsall NN, Nester MT (2001) Human perspective microbiology Mcgraw-hillinc. Company 3: 657-658.
- 8 Swygard H, Sena AC, Hobbs MM, Gohen MS (2004) Trichomoniasis clinical manifestations diagnosis and management. Sexually Transmitted Infections 80: 91-95.
- 9 Patel V, Weiss RA, Mabey D, West BD, Souza S, et al. (2005) The burden and determinants of reproductive tract diseases in India; a population based study of women in Gao, India. Sex Transmission Infections 82: 243-249.
- 10 Rathore M, Vyas L, Bherdusaj AK (2007) Prevalence of reproductive tract infections amongst married women and socio-cultural factors associated with it. Journal of Indian medical association 105: 71-72.
- 11 Lawing LF, Hedgas SR, Schwebk JR (2000) Detection of Trichomoniasis in vaginal and urine specimen from women. Journal of clinical microbiology 38: 3585-3588.
- 12 Mayta H, Gilman HR, Calderon M, MandGoftlieb A (2000) Ribosomal DNA-base PCR In diagnosis of *Trichomonas vaginalis*. Journal of clinical microbiology 38: 2638-2687.
- 13 Gary E, Garber K (2005) The laboratory diagnosis of *Trichomonas*

Conclusion

Generally, *Trichomoniasis*, though with its low prevalence is clearly associated with significant public health problems including HIV transmission and other sexually transmitted disease. Infection presentation is highly variable as majority of the women and men are often asymptomatic carriers who usually escape diagnosis and treatment thereby constituting major source of Spread and transmissions. Diagnosis of *Trichomonas* infection is usually problematic due to high sensitive nature of the parasite to drying effect and to atmospheric oxygen. The parasite therefore does not survive beyond few hours once they leave the human body. Even though, sexual contact has been tagged the most common route of transmission, other sources such as fluid contaminated fomites, congenital and other non-sexual source aid in transmission through moist secretions occasionally especially by women.

vaginalis. Canaian Journal of infectous Disease and Medical Microbiology 16: 35-38.

- 14 Anorlu RI, Fagbenro-Beyioku AF, Fagorola T (2001) Prevalence of *Trichomonas vaginalis* in patients with vaginal discharge in Lagos. Nigerian Postgraduate Medicine Journal 8: 183-186.
- 15 Soper D (2004) Trichomoniasis: under control or under controlled? AJONG Review 90: 128.
- 16 McClelland K, Samgare RST, Hessian T, Lavreys MH, Madaliya LK, et al. (2007) Infection with *Trichomonas vaginalis* increases the risk of HIV-1 acquisition. Journal of infectious diseases 195: 698-702.
- 17 Sharma AK, Ranjam R, Mehta G (2004) Prevalence of and determination of reproductive tract infection among women .Journal of Community disease 36: 93-99.
- 18 Divekar AA, Gogate AS, Shivkar LK, Gogate S, Badhwar VR (2000) Disease prevalence of women attending the STD clinic in Mumbai, India. India International Journal of STD/AIDS 11: 45-48.
- 19 Galadanci HS, OO Abudu, I Fagorala, AF Beyioku, RI Anorlu (2001) Prevalence of *Trichomonas vaginalis* in Patients agorala. Prevalence of *Trichomonas vaginalis* in patients 52: 168.
- 20 Anosike JC, Ogbonna AA, Ogbonna IB, Ogbonna CI (1991) Studies on the Incidence of *Trichomonas vaginalis* amongst pregnant women in Jos Area of Plateau Sate. Angew Parasitology 32: 198-204.
- 21 Arambulo PV, BD Cabrera, TS Osteria, JC Baltazor (1977) A Comparative study of *Trichomonas vaginalis* Prevalence in Filipino Women” Southern east Asia. Journal of Tropical Medical Health 8: 298 302.
- 22 Onwuluri CO, Anosike JC, Inyang RE, Akoh JI, Nwoke BE, et al. (1993) *Trichomonas* Amongst students of a higher institution in Nigeria. Applied Parasitology 34: 19-25.
- 23 Krieger JN (1995) Trichomoniasis data “Sexually Transmitted Disease 22: 82-96.
- 24 Tanyukseli M, Doganci GUM (1996) Prevalence of *Trichomonas vaginalis* in prostitute in Turkey. Central European Journal of public Health 4: 96-97.
- 25 Wendel KA, Erbeling EJ, Gaydos CA, Rompalo AIM (2003) Use of urine polymerase chain reaction (PCR) to define the prevalence and

- clinical presentation of *Trichomonas vaginalis* in men attending an STD clinic. *Sexually Transmitted infections* 789: 151-153.
- 26 Saxena S (1991) Prevalence of *Trichomonas vaginalis* in Men at high risk for sexually transmitted diseases "Sexually transmitted diseases 18: 138-142.
 - 27 Woken GN (2006) *Trichomonas vaginalis* infection in some parts of Niger Delta Region, River State Nigeria *Journal of Parasitology* 127: 68-72.
 - 28 Acholonu ADW (1998) Trichomoniasis: A little recognized sexually transmitted disease but with grave consequences. Public lecture, Nigeria Academy of Science Lagos 14: 163.
 - 29 Petrin D, Delgaty K, Bhatt R, Garber G (1998) Clinical and microbiological aspects of *Trichomonas vaginalis*. *ClinMicrobiol* 11: 300-317.
 - 30 Obiajuru JO, Njoku AJ, Oggulie JN (2002) Prevalence of Trichomoniasis and other sexually transmitted disease. *Imo state Nigeria* 22: 18- 20.
 - 31 Woken GN (2006) *Trichomonas vaginalis* infection in some parts of Niger Delta Region, River State Nigeria. *Journal of Parasitology* 27: 68-72.
 - 32 Ulogu O, kejindu IM (2007) Prevalence of Trichomoniasis among women in Nnewi, Anambra State Nigeria, *Nigerian Journal of Parasitology*, 28: 24-30.
 - 33 Sumadhya DF, Sathya H, Chaturaka R, Lalani R (2012) Clinical features and sociodemographic factors affecting *Trichomonas vaginalis* infection in women attending a central sexually transmitted diseases clinic in Sri Lanka, *Indian J sex Transm Dis* 33: 25-31.
 - 34 Annang L, Walsemann KM, Maitra D, Kerr JC (2010) Does education matter? Examination racial differences in the association between education and STI diagnosis among black and white young females in the U.S, *Public Health Rep.* 125 supply 4: 110-121.
 - 35 Lossick, JG (1989) Therapy of Urogenital trichomoniasis Parasitic in man" 24: 324-341.
 - 36 Nester EW, Anderson DG, Evans C, Roberts J, Pearsall NN, et al. (2001) *Genitourinary Infections; Protozoan Sexually Transmitted Diseases. Microbiology: A human Perspective. McGraw Hill Third Edition* 32: 657-658.
 - 37 Rein MF, Muller M (1990) *Trichomonas vaginalis* and *Trichomoniasis"* sexually transmitted disease McGraw Hill; 481-492.
 - 38 Sorvillo, Smith L, Kerndt P (2001) *Trichomonas vaginalis*, HIV, and African - Americans. *Emerg Infect Dis* 7: 927-932.
 - 39 Cohen J (2000) HIV transmission. AIDS researches look to Africa for new insights "science 187: 942.
 - 40 Upcroft P, Upcroft JA (2001) Drug targets and mechanism of resistance in the anaerobic protozoa. *Clin Microbiol* 14: 150-1554.
 - 41 Cohen MS, Hobbs MM, Seria AC, Swygard H (2004) Trichomoniasis: Clinical manifestations, Diagnosis and Management" *Sexual Transmitted Infection* 80.
 - 42 Schwebke JR (2002) Improved detection by DNA amplication of Trchomoniasis in male. *Journal Clinical Microbiology* 40: 3681-3683.
 - 43 George R, Thomas K, Thyagarajan SP, Jeyaseclan L, Predecayil A, et al. (2004) Genital syndrome and syndromic management of vaginal discharge in a community setting .*International journal of STD AIDS*15: 62 68.
 - 44 Okoko FJ (2011) Prevalence of Trichomoniasis among women at Effueun Metropolis. *Continental Journal of Biological Sciences* 4: 45-48.
 - 45 Ochei KC, Obeagu EI, Ugwu GU, George CN (2014) Prevalence Of *Trichomonas Vaginalis* Among Pregnant Women Attending Hospital In Irrua Specialist Teaching Hospital In Edo State, Nigeria. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 13: 79-82.