

Pregnant Women with Trichomoniasis in a West African State: A Review

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Abstract

Introduction: *Trichomonas vaginalis* has been a key common treatable transmitted infection sexually. In spite of the countless severe health implications to include aiding the acquisition and spread of viral infections, PID and serious consequences of pregnancy, it is still under-diagnosed. This review aims to update the reader on the prevalence of *T. vaginalis* among pregnant women in Nigeria, and to also buttress the risk posed by this infection on pregnancy as well as the symptoms/factors that promote transmission. **Methodology:** Google search engine was used to access the information on web from 2005 - 2020 and used in this study.

Result: An average national prevalence of 10.4% was observed from this study among pregnant women.

Conclusion: Sexual promiscuity, age and socio-economics, remain valuable indices in understanding the distribution of infection within evaluated data space. Complications such as low-birth weight and premature delivery are prevalent with *Trichomonas vaginalis* infection. Therefore, it will be important to encourage people not to have more than one sex partner, as well as avoiding unhealthy sex habits. Also, improvement on personal care and hygiene.

Keywords: *Trichomonas vaginalis*; Prevalence; Pregnant Women; Infection; Nigeria

Introduction

Trichomoniasis is a parasitic infection which infects the urethra (the tube that carries urine out of the body) in men and the vagina and urethra in women (Petrin., *et al.* 1998). It is usually more reported in women than men (being asymptomatic carriers). About 7.4 million people are being infected globally each year [1]. Trichomoniasis is most commonly transmitted during vaginal intercourse [2].

Approximately half of people infected with trichomoniasis experience no symptoms. Symptoms are commonly seen about four to twenty days after infection [1,3]. *Trichomonas vaginalis* as a protozoan parasite with flagella, are diverse in size within 10 µm and 7 µm in length and width respectively. It usually has an oval or pear - like shape, but can assume an amoeboid form when attached to vaginal epithelial cells. *T. vaginalis* has a total of 5 flagella, four of which are located at its anterior portion. The flagellum that makes it five is within the undulating membrane [4]. It commonly lives as an anaerobic parasite with its trophozoite stage without a need to exist as a cyst. Its mode of reproduction is by longitudinal binary fission with optimum growth observed at 37°C and pH 6.0 - 6.3. However, they can strive for up to pH7 [2]. Other issues arising due to *Trichomonas vaginalis* that have been reported in pregnant women include premature rupture of membranes, premature labour, low birth weight and post abortion infection. *T. vaginalis* has also been reported in the urinary tract, fallopian tubes, and pelvis and can cause pneumonia, bronchitis and oral lesions. It had also been linked to infection with HIV and

cervical cancers [5]. It had been observed that cervicitis arising from *Trichomonas* infection is known to give purulent discharges around the endocervical region of the female reproductive system while causing bleeding within the region [1].

Aim of the Study

The aim of this review therefore is to determine the prevalence of *Trichomonas vaginalis* among pregnant women in Nigeria.

Mode of transmission

Trichomonas vaginalis has been known to be transmitted mainly through sexual contact with vaginal or urethral discharges of infected persons. It is also possible to transmit the infection through artificial insemination of infected cryo-banked semen is also possible. The parasite, *Trichomonas vaginalis*, is also sexually transmitted by oral and anal sex [2].

However, research have shown that urogenital inoculation with 10,000 to 12,000 organisms has resulted in transmission, although epidemiological examinations have shown that the effective dose in woman is lower and the infection rate is high [6]. This could be as a result of their structural anatomy and the natural postural inclination to the act of sex by the female gender; being the gender with the receptacle on the receiving end [7]. Humans are basically the reservoir host [8] and persistent infection could be seen in asymptomatic cases for up to a year or more [9].

Transmission through non-sexual contacts could be rarely seen, nevertheless, it had been reported in instances that involved the use of contaminated douche nozzles, wet clothing, specula, or seat of the toilet water system [2]. Perhaps, trichomoniasis can very occasionally be transmitted by sharing sex toys, damp towels or hot tubs [1].

Similarly, infants could contract the infection through from their infected mothers during childbirth. Additionally, this can be seen occurring in about two to seventeen of every one hundred cases with complications leading to urinary tract or vaginal infections [6]. Incubation period for trichomoniasis ranges from 3 to 28 days, with an average of 7 days [2].

Global epidemiology

Globally, trichomoniasis is a major transmittable infection with approximately 170 million infections every year (Petrin., *et al.* 1998). Its occurrence had been seen to be high in black females without Hispanic origin [10]. Infact, this infection has been frequently observed to be predominant in females within their active reproductive years. Consequently, it is rarely seen to occur in adolescents preceding menarche and in adult females after menopause [2]. Fourteen to sixty percent of male infections can be traced to female conjugate partners who had been infected before. Studies have shown prevalence of mixed infections with *T. vaginalis*, *Gardnerella vaginalis* and with *Neisseria gonorrhoea*.

Apparently, persons who are infected with *Trichomonas vaginalis* a greater chance to contract HIV than those without trichomoniasis. This is explained by the fact that an association exists between acquisition of *T. vaginalis* and HIV: disruption of the epithelial monolayer cells leading to microulcerations of inhabited tissues and increased passage of the HIV virus [1]. Research had shown significantly that *T. vaginalis* trigger immune activation, more especially lymphocyte activation, replication and cytokine production, resulting into a high viral replication in HIV infected cells [11]. In United States of America, five million women and one million men are infected annually [1]. Incidence 5 out of everyone hundred persons have been reported to be asymptomatic, more than half of commercial sex workers, and generally between 0.9 to 39.6 percent in sexual intercourse related transmissions in American clinics. Africa, a land of promise with largely under developed territories, has a far higher infection rate with *Trichomonas vaginalis* than developed economies [8].

Diagnosis

Proper diagnosis of *Trichomonas vaginalis* is key to adequate management of patients. Current laboratory diagnosis includes direct microscopic observation, cell culture, immunological techniques, PCR assay, nucleic acid probe test, immunochromatographic capillary flow dipstick technology, DNA probing and gene amplification, and in situ hybridization and plastic envelop method [1]. Direct examination of wet mount preparation of hospital samples produces results fast. It is the most frequently applied and the most cost-effective in the diagnosis of trichomoniasis in females even though the culture of this organism using vaginal swab specimen remains the current “gold standard” [8]. In spite of the fact that, PCR methods for *T. vaginalis* diagnosis are being researched globally, the use of wet mount examination alongside culture, has been advanced as being more profitable in the identification of *T. vaginalis* than either one alone [10].

Symptoms

Men almost never have symptoms. When females exhibit symptoms, they usually appear within 4 and twenty days of first exposure to the pathogen. The symptoms in women include a heavy, yellow-green or gray vaginal discharge, discomfort during intercourse, vaginal odor and painful urination. Irritation and itching of the female genital area and on rare occasions, lower abdominal pain also can be present [2].

The parasite *T. vaginalis* can be seen in the vagina, cervix, bladder, Bartholin, skene, and periurethral glands. This may further cause cervical erosion/cancer, inability to be pregnant, adnexitis, pyosalpinx and endometritis. Acute infections are characterized by severe pruritus, vaginitis, vulvitis with dysuria and dyspareunia, and hemorrhagic spots on the mucosa (in 2 out of 100 patients) which results in colpitis macularis or petechiae (strawberry cervix). In females, half of the diagnosable cases are asymptomatic. *Trichomonas vaginalis* can survive indefinitely in the lower urogenital tract if left untreated causing its own damage (Swygard., *et al.* 2004).

That notwithstanding, trichomoniasis observed in men are not as problematic as that seen in women. Nevertheless, once a male is infected, *T. vaginalis* could be seen at the anterior urethra, external genitalia, prostate, epididymis as well as in the semen. Symptoms may range from none to urethritis, complicated by prostatitis, epididymitis, urethral stricture and infertility [11]. Spontaneous resolution of the infection is a frequent phenomenon as it is believed that the oxidative nature of the male genital tract is helps to inhibit the virulent factors of *T. vaginalis* infection, which is usually renewed for 10 days or less (Swygard., *et al.* 2004).

Treatment of trichomoniasis

Men can transmit the disease to their sex partners even when symptoms are not present. Therefore, in cases of infections, it is more convenient for the elimination of the parasite, to administer Metronidazole, the drug of choice for the treatment of trichomoniasis [2]. Other drugs that can be used in countries outside of the US are Tinidazole, Ornidazole, Secnidazole and Nimorazole. This is mainly administered in a single dose. One-week abstinence from sex is advocated to see if symptoms of STD reappear after treatment [1]. Researches on drug resistance have shown that at least five out of a hundred of hospital infections diagnosed to be trichomoniasis were due to metronidazole-resistant *T. vaginalis*. Also, cross-resistance to tinidazole has been noted as a concern as the two drugs follow similar path of drug action [2].

Prevention

Prevention has not been a priority due to lack of understanding of its public health implications and lack of resources because for long it has been considered a “minor” STD [12]. The need for more enlightenment, abstinence from unprotected sexual intercourse, personal hygiene and avoidance of sharing of wet towels, etc., as well as accurate laboratory diagnosis are essential to prevention and control of the infection [12]. Routine check on pregnant women for trichomoniasis should be advocated by healthcare practitioners as a way of pre-

vention and control of the infection during their antenatal visits to hospitals due to the adverse effect this organism poses on pregnancy.

Materials and Methods

Area of study

Nigeria as a multi-cultural and multi-ethnic society with six geopolitical zones, having a divergence of resources and climatic conditions, with Abuja as its Capital, an architectural master piece that stands tall as one of the most beautiful cities in Africa, however, has its people preoccupied mainly as farmers, traders, fisher men and miners.

Methodology

The study is a review on the prevalence of *T. vaginalis* infection in Nigeria among pregnant women. Google search engine was used to access the information on web from 2005 - 2020 and used in this study.

Result

In Lagos State, a total of 544 women from Lagos University Teaching Hospital (LUTH), Idi-Araba, Lagos and Military Hospital, Yaba, Lagos were examined for trichomoniasis infection. A prevalence of 3.3% was recorded from the 544 women. 5.4% in the Military Hospital and 1.9% from LUTH. Age group 21 - 30 years had the highest prevalence of 1.8%. About 1/5th of the infected women were asymptomatic [13]. The difference in prevalence was statistically significant using Chi-Square test analysis ($P < 0.05$).

The prevalence of *T. vaginalis* was determined by Olusola, *et al.* [3] among two hundred (200) pregnant women attending antenatal clinic at Ogun State Hospital, Abeokuta, using a cross sectional descriptive study, urine and high vaginal swab samples were collected. Forty out of two hundred pregnant women, 40 (20%) were observed to be infected with *T. vaginalis*. The women within the age bracket of 20 - 30 years, had the highest prevalence of 21.3% whereas those less than 20 years old had the lowest of 12.5% prevalence rate. However, the difference between the age groups made no statistical impact. Women in second trimester had highest prevalence of 25% while those of the in third trimester were the lowest with 18%. In this study, HVS microscopy had a prevalence of 40% while urine had 5.5% and this difference was statistically significant $P = 0.0041$ [3].

Similarly, in another study, a total of 562 outpatient pregnant antenatal women made up of 220 from the General Hospital, Calabar and 342 from the University of Calabar Teaching Hospital, Calabar (UCTH), were examined for *Trichomonas vaginalis* infection using direct microscopy and Giemsa staining techniques on high vaginal swab specimen. A prevalence of 29 (5.2%) was recorded using both methods. 12 (5.5%) in General Hospital, Calabar and 17 (5.0%) in University of Calabar Teaching Hospital, Calabar, respectively. Differences in hospitals used were statistically significant ($P < 0.05$). females between the age bracket 20 - 24 years showed the highest prevalence of infection 12 (10.8%) while age group 15 - 19 years 8 (10.3%). A higher prevalence rate of 9 (8.3%) was recorded among women in their first trimester of pregnancy, in single (unmarried) pregnant women 7 (5.3%) and in women with primary school education 12 (6.4%) [14].

Other prevalences of *T. vaginalis* obtained in Nigeria among pregnant women include 4.7% reported in Ilorin, Nigeria [15], 2.7% prevalence in Jos, Nigeria [16], 2.8% in Abakaliki, Nigeria [17]. 12.5% in Enugu Nigeria [18], 15.0% in Benin City, Nigeria [19], 17.7% in Uyo, Nigeria [20], 18.7% in Zaria, Nigeria. Another study was carried out by Ochei, *et al.* [21] at Irrua Specialist Teaching Hospital in Edo State, Nigeria where out of the 180 pregnant women chosen for this study, no prevalence rate of *Trichomonas vaginalis* was recorded.

Donbraye, *et al.* [22] reported a prevalence rate of 6.0% among 100 pregnant women attending antenatal clinic at Adeoyo Maternity Hospital in Ibadan, Nigeria. High prevalence rate of (11.8%) was detected in pregnant women of age group less than 20 years, followed

by 30 years and above (5.0%) while age group 20 - 29 years had the least (4.8%) women in 2nd trimester had (10.0%) while women in 3rd trimester had (5.5%).

A total of 919 pregnant women attending antenatal clinics in Maiduguri Metropolis of Northeastern Nigeria were studied by Mairiga, *et al.* [23] which gave a prevalence rate of 101 (10.99%) for *Trichomonas vaginalis* infection. Age groups between 15 and 26 years gave highest prevalence of (46.5%).

Jatau, *et al.* [24] worked on 300 pregnant women attending antenatal clinics in three Hospitals in Zaria and got prevalence rate of 18.66% for *T. vaginalis* microscopic examination and culture technique. Age group 16 - 25 years had the highest prevalence rate of 53.57% followed by the 26 - 35 years with prevalence of 32.14%.

Discussion

From the various studies, the prevalence obtained may be useful for health authorities, especially for antenatal care and protection against STDs. The higher recovery rate obtained by using HVS microscopy confirms its advantage over urine microscopy in the diagnosis of *Trichomonas vaginalis* [21,23,24]. The need for abstinence from multiple sexual relationships, improved personal hygiene, environmental sanitation, e.g. use of clean toilets and other effective intervention programs among these vulnerable group of women is advocated by the center for disease prevention and control, USA [1]. In the study by Ochei, *et al.* [21], the low prevalence obtained could be due to the use of only urine samples. High vaginal swab (HVS) has proven to be a better specimen for the diagnosis of *Trichomonas vaginalis* among pregnant women [24]. Therefore, further studies should include the use of high vaginal swabs.

Trichomonas vaginalis transmission is independent of the trimester of pregnancy among Nigerian women. That is, there is no association of infection with gestational age. Although, some studies such as that carried out by Usanga, *et al.* [14] and Olusola, *et al.* [3] showed that pregnant women in their third trimester had lower prevalence of *Trichomonas vaginalis* infection. In most cases, the frequency of sexual intercourse decreases as pregnancy advances and this may likely be the reason for the low incidence of infection at third trimester. However, this observation was in contrast with findings in Abakaliki, Nigeria [17] who reported that women in the third trimester of pregnancy were more infected with *T. vaginalis*. Trimester may or may not affect transmission of *T. vaginalis* in pregnancy. Marital-status of pregnant women examined in some studies was found to be associated with infection. Pregnant women who are unmarried were observed to have a higher rate of infection than the married folks [14]. This gives credence to the notion that single females who are yet not married and do indulge in multiple sexual partners are at a higher risk of infection with *T. vaginalis*. This corroborates finding by Okpara, *et al.* [20] who reported that single women were more infected in their study.

According to Jatau, *et al.* [24] from the various studies reviewed, for those that carried out microscopy and cultural techniques, high recovery rates of parasites were obtained. Certainly, the true dynamics of *T. vaginalis* infection are unknown, nevertheless, the most striking feature of the epidemiology is the consistently high prevalence found in sexually active women and disadvantaged populations. It also demonstrates the importance of employing both direct microscopy and culture techniques in the diagnosis of trichomoniasis [24]. Unfortunately, screening for *T. vaginalis* among pregnant women using microscopy is inadequate, even though, it remains the most widely utilized diagnostic test for this infection. Culture methods are currently the gold standard and should be considered for widespread clinical use [17].

This present review is significant because, according to findings, treatment possibilities are limited in pregnant women because of potential risks for the developing foetus. Therefore, there is the need for prompt diagnosis and adequate treatment to arrest the situation. However, among clinicians, there had been reluctance to use metronidazole for trichomoniasis in pregnant women (particularly in the United States of America) because of reported weekly mutagenic effects in bacteria and carcinogenic effects detected in rodents, however no teratogenic effects have been detected during the long use of metronidazole in human.

The high prevalence of *Trichomonas vaginalis* infection in pregnancy might be due to the greater pelvic vascularity and oestrogenic activity of the vaginal epithelium which causes growth, maturation and exfoliation of the squamous cells and an increase in glycogen deposits in vaginal epithelium cells. *T. vaginalis* is associated with alkaline vaginal environment that occurs during pregnancy due to changes in the pH of the vaginal mucosa.

During pregnancy, women tend to void urine frequently and make use of public toilets which can also be a source of infection in cases of splashing of dirty water from these toilets. Hence, the need for pregnant women to be involved in good sanitation practices.

The differences in prevalence obtained from the various studies could be explained on the basis of differences on social, cultural and environmental factors. It is generally observed that the incidence of sexually transmitted diseases (STDs) including trichomoniasis, by the number of cases treated each year, is highest among the 15 - 30 years age group [22].

In most of the studies that also included educational background, those with primary education have the highest prevalence. The findings in Ilorin, Nigeria [15,23] showed that low level of education was associated with significant *T. vaginalis* infection among pregnant women. Therefore, there is need for the provision of proper counseling and education on sexual behavior and genital hygiene, besides treatment, to control and prevent trichomoniasis especially during pregnancy. Sexual liberalism linked to wealth, lack of adequate financial strength, lack of adequate knowledge and inadequate awareness on public health consequences, could probably become the major risk factors [13]. Perhaps, this may have been the case in some of the states where these studies were carried out. On the other hand, other states' studies, had low prevalence rates for example 4.7% reported in Ilorin, Nigeria, 2.7% prevalence in Jos, Nigeria, 2.8% in Abakaliki, Nigeria, 3.3% in Lagos, Nigeria and 6.0% prevalence in Ibadan, Nigeria. However, the above observation is at variance with a higher prevalence rate reported in some states for example 12.5% in Enugu, Nigeria, 15.0% in Benin city, Nigeria, 17.7% in Uyo, Nigeria and 18.7% in Zaria, Nigeria. In the same vane, there is a growing opinion that the prevalence of *T. vaginalis* differ significantly with respect to locations and environment. Thus, these distinctions in prevalence may be due to their differences in environment conditions and varying culture of the studied population.

Health education about the causes and mode of transmission of *Trichomonas vaginalis* must continually be encouraged. Also, it will be important to encourage the avoidance of multiple sex partners, and indiscriminate sex habit, as well as improvement of personal care and hygiene. Furthermore, encouragement of the use of condoms when having sex for the unmarried; periodic screening especially in pregnancy and adequate treatment if infected, are a necessity for control and prevention. Government (particularly in developing economies) should improve the socio-economic status of their citizenry.

Conclusion

Trichomonas vaginalis infection in pregnancy is a public health risk based on the different prevalence rates obtained from this present article review, especially keeping in mind that HIV infection and other STIs can be enhanced with *Trichomonas vaginalis* infection. Thus, healthcare practitioners should make it mandatory for screening of every pregnant women for *T. vaginalis* infection. This should precede the early administration of the right treatment to prevent further transmission of other sexually transmitted infections and its possible impact on the foetus. Emphasis must be placed on youths and those with low educational background. The policy formulators and implementation team have a responsibility to incorporate community enlightenment of the girl child on sexuality, safe sex and good hygiene at an early stage of their development. They are also expected to among other things, institute policies and health programs that will make health care services accessible, affordable and standard. This review has confirmed the endemicity of *Trichomonas vaginalis* infection among pregnant women in Nigeria and suggests that the control of trichomoniasis can best be accomplished by public health programs through persistent efforts to educate the populace early and always.

Author Contributions

Material Search (JPA and AUU), Article Write-up (AUU and JPA), Manuscript Design and supervision (AUU and JPA) and all authors read through the work and approved the final manuscript.

Bibliography

1. Center for Disease Control and Prevention (CDC). *Morbidity, Mortality Weekly Recommendation Report* 5 (2006): 1-94.
2. Cudmore SL, et al. "Treatment of infectious caused by metronidazole - resistant *Trichomonas vaginalis*". *Clinical Microbiology Reviews* 17.4 (2004): 783-793.
3. Olusola O, et al. "Prevalence of *Trichomonas vaginalis* infection among pregnant women in Abeokuta, Nigeria". *Sieria Leone Journal of Biomedical Research* 2 (2010): 2.
4. Garber GE. "The laboratory diagnosis of *Trichomonas vaginalis*". *The Canadian Journal of Infectious Diseases and Medical Microbiology. Journal Canadian Des Maladies infectieuses Et De La Microbiologie Medical. AMMI Canada* 16.1 (2005): 35-38.
5. Sobel JD. "What's new on bacterial vaginosis and trichomoniasis?" *Infectious Disease Clinics of North America* 192 (2006): 287-406.
6. Peterson K and Drame D. "Latrogenic transmission of *Trichomonas vaginalis* by a traditional healer". *Sexually Transmitted Infections* 86.5 (2010): 353-354.
7. Aaron UU, et al. "Public Health Implications of HIV Incidence in Orashi Communities of Niger Delta, Nigeria". *EPRA International Journal of Multidisciplinary Research* 3.4 (2017): 80-87.
8. World Health Organization (WHO). "Sexually transmitted infection". WHO medical center (2007).
9. Webber R. "Communicable Disease Epidemiology and Control (3rd edition)". Cambridge, UK: Cambridge University Press (2009).
10. Sutton M, et al. "The prevalence of *Trichomonas vaginalis* infection among reproductive age women in the United States - 2004". *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America* 45.10 (2007): 1319-1325.
11. Smith DA and Ramos N. "Trichomoniasis eMedicine Specialties". Website: emedicine. *Medscape* (2010).
12. Stood S and Kapil A. "An update on *Trichomonas vaginalis*". *Indian Journal of Sexually Transmitted Diseases* 29 (2008): 7-14.
13. Adeoye GO and Akande AH. "Epidemiology of *Trichomonas vaginalis* among women in Lagos Metropolis, Nigeria". *Pakistan Journal of Biological Sciences* 10.10 (2007): 2198-2201.
14. Usanga V, et al. "*Trichomonas vaginalis* infection among pregnant women in Calabar, Cross Rivers State, Nigeria". *The Internet Journal of Gynaecology and Obstetrics* 14.2 (2009): 101-107.
15. Aboyeji AP and Nwabuisi C. "Prevalence of Sexually transmitted diseases among pregnant women in Ilorin, Nigeria". *Journal of Obstetrics and Gynaecology* 23 (2003): 637-639.
16. Jumbo GTA, et al. "High vaginal and endocervical swabs: A bacteriological study of 8, 4333 samples in Jos, Nigeria". *Journal of Medical Laboratory Science* 15.2 (2006): 41-46.
17. Uneke CJ, et al. "*Trichomonas vaginalis* infection among pregnant women in South Eastern Nigeria. the public health significance". *The Internet Journal of Gynaecology and Obstetrics* 6.1 (2006): 17-21.

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18. Nwosu MN Mba., *et al.* "General ulcers and sexual transmitted disease in rural Nigeria". *Journal of Medical Investigation and Practice* 2 (2001): 28-33.
19. Akerele J., *et al.* "Prevalence of Asymptomatic genital infection among pregnant women in Benin city, Nigeria". *African Journal of Reproductive Health* 6.3 (2002): 93-97.
20. Okpara K., *et al.* "Risk Factors for Vaginal Trichomonias among women in Uyo. Nigeria". *The Internet Journal of Health* 9.2 (2009): 101-115.
21. Ochei KC., *et al.* "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)* 13.11 (2014): 79-82.
22. Donbraye E., *et al.* "Detection and Prevalence of *Trichomonas vaginalis* among pregnant women in Ibadan, South Western Nigeria". *World Applied Sciences Journal* 11.12 (2010):1512-1517.
23. Mairiga AG., *et al.* "Prevalence of *Trichomonas vaginalis* infections among antenatal clients in Maiduguri, Nigeria". *International Journal of Biological and Medical Research* 2.4 (2011): 998-1002.
24. Jatau ED., *et al.* "Prevalence of *Trichomonas vaginalis* infection among women attending antenatal clinics in Zaria, Nigeria". *Annals of African Medicine* 5.4 (2006): 178-181.

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