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Prevalence of sexually transmitted infections (stis) among attendees of lead city university medical centre in Ibadan, Southwestern, Nigeria

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ABSTRACT

The prevalence of sexually transmitted infections (STIs) among attendees of Lead City University Medical Centre in Ibadan was studied. Blood, high vaginal swabs (HVS) and Endocervical swab (ECS) samples were aseptically collected from two hundred (200) subjects attending the Medical Centre, and investigated for various etiologic agents of sexually transmitted diseases (STDs) including Neisseria gonorrhoeae, Candida albicans, Trichomonas vaginalis, Gardnerella vaginalis (Bacterial vaginosis), Treponema pallidum (Syphilis), Hepatitis B surface Antigen (HBsAg), Human immunodeficiency virus and Chlamydiae species, using standard microbiological methods. The HVS and the ECS swabs were analyzed using direct wet smear, Gram-stained smear and culture techniques while blood samples were examined serologically using standard proprietory reagents. Out of the 200 samples examined, 195(97.5%) were infected with various aetiologic agents and 5 (2.5%) had growth of Staphylococcus aureus. In these patients, Candida albicans had the highest percentage of infections 163(81.5%). This was followed by Gardnerella vaginalis (Bacterial vaginosis) 23(11.5%), Trichomonas vaginalis, 4(2.0%), Treponema pallidum (Syphilis) 3(1.5%) and Neisseria gonorrhoeae 2(1.0%). Others were Staphylococcus aureus [5(2.5%)]. However, Chlamydia trachomatis, HBsAg, HCV and HIV were not detected. The prevalent rates of infections were inversely associated with increase in age, sex and marital status. Increased routine screening for STIs is essential in preventing disease transmission and adverse outcomes among these groups.

Keywords: *N. gonorrhoeae, C. albicans, T. vaginalis, G. vaginalis, T. pallidum,* HBsAg, HIV, Chlamydia species.

INTRODUCTION

Sexually transmitted diseases (STDs) are a group of infectious or communicable diseases in which the primary mode of transmission is through sexual contact [1] and are among the major causes of illnesses in the world especially in the developing countries [2-3]. The diseases caused by STDs are classified according to the type of organism causing the infection, which could be bacterial, fungal, viral or of parasitic origin [4]. Some of the common sexually transmitted diseases include: *Bacterial vaginosis*, herpes, Chlamydia, trichomoniasis, gonorrhoea, Hepatitis B virus, HIV and syphilis [4]. More than 25 infectious organisms are transmitted primarily through sexual activity and studies reveal that STDs are among the many related factors that affect the broad continuum of reproductive health [5].

STDs are characterized as hidden epidemics of tremendous health and economic consequences that can lead to pains, organs damage, and serious disabilities such as blindness, deafness, infertility, insanity, paralysis and even death [6-7]. Probably of concern to all is that STDs, especially in pregnant women, have been associated with a number of adverse pregnancy outcomes including spontaneous abortion, stillbirth, prematurity, low birth-weight,

post partum endometritis, early onset of labour including premature rupturing of membranes, cervical and other cancers, chronic hepatitis, pelvic inflammatory diseases and various sequalae in surviving neonates [8]. In non-pregnant women, STDs can lead to chronic infertility [8].

Documented evidence indicates that STDs can be transmitted from a pregnant mother to the baby, before; during or after the baby's birth and that some STDs (like syphilis) can cross the placenta and infect the baby in-utero [8]. Other STDs (like gonorrhoea, chlamydia, hepatitis B viruses and Genital herpes) can be transmitted to the baby during delivery through the birth canal [9-10]. HIV can cross the placenta during pregnancy, infect the baby during the birth process and unlike other STDs, can infect the baby through breast feeding [11].

It is estimated that the number of pregnant women with STDs is increasing by about 250 million a year in the developed countries and double that number in the developing countries [12]. In spite of the sequelae of these infections, there is inadequate statistical data on the prevalence of STDS among attendees of Lead City University Medical Centre in Ibadan, Southwestern Nigeria. The aim of this study is to document the pattern of common STIs and to evaluate the frequency of occurrence of STDS isolates among attendees of LCU Medical Centre in Ibadan, Southwestern Nigeria and to assess the role of socio-demographic and behavioral risk of the subjects on STDs.

MATERIALS AND METHODS

Study area

The study was carried out in the toll gate area of Ibadan. Ibadan city lies 3°5' E and 7°23' N. The city is characterized by low level of environmental sanitation, poor housing, and lack of potable water and improper management of wastes especially in the indigenous core areas characterized by high density and low income populations.

Study population

Two hundred consecutive patients (10 males and 190 females) of different ages and socioeconomic status, who attended the STI clinic of LCU Medical Centre in Ibadan, with one or more of the complaints as enunciated by WHO in its syndromic approach for the diagnosis of STI [13-14] were included as subjects. Followed up patients and asymptomatic patients were excluded from the study. Detailed history, demographical data, and clinical features were recorded from all the patients. Other relevant information of all participants was obtained using a Performa specially designed for this purpose. All were screened for common STIs by standard microbiological methods [14-16]. Table 1 shows demographic profiles of the attendees of Lead City University Medical Centre, Ibadan, Southwestern Nigeria.

Table 1: Demographic profiles of the attendees of Lead City University Medical Centre, Ibadan, Southwestern Nigeria

Profiles	No. Tested (%)	No. males (%)	No. females (%)
Age Group (years)			
16-29	188(94.0)	10(5.3)	178(94.7)
30 and above	12(6.0)	0(0.0)	12(100.0)
Sex			
Males	10(5.0)	10(100.0)	0(0.0)
Females	190(95.0)	0(0.0)	190(100.0)
Marital status			
Married	10(5.0)	0(0.0)	10(100.0)
Single	190(95.0)	10(5.3)	180(94.7)
Total	**200(100.0)**	**10(5.0)**	**190(95.0)**

Specimen collection

Urethral swab, high vaginal swab (HVS) and endocervical swab (ECS) were collected from males and females, respectively, and subjected to direct examination by wet preparation, Gram staining and culture plate inoculation at the Department of Microbiology, Lead City University, Ibadan. Gram stain was carried out on both ECS and HVS and examined with 100x objective under oil immersion for Gram negative diplococci and clue cells.

Direct examination

Wet mounts of all swab samples were made in sterile normal saline on clean slides and examined under the low power (10x) and high power (40x) magnifications for typical yeast cells with hyphae or pseudohyphae and for *Trichomonas vaginalis*. Gram stain was carried out on both ECS and HVS and examined with 100x objective under oil immersion for Gram negative diplococci and clue cells. Endocervcal swab specimens were inoculated into blood agar and Thayer Martin agar (prepared as described by Thayer and Martin, 1966) while HVS specimens were inoculated into blood agar and sabouraud dextrose agar (SDA) [Biotec, Ipswich, UK].

Identification of isolates

Yeast isolates were screened for germ tube production in serum broth. *Candida albicans* were identified on the basis of the following features: thick-walled oval yeast cells with pseudomycelium and germ tube formation in human serum at 37^0C. Germ tube negative species were regarded simply as yeast species. *Gardnerella vaginalis* was identified by a combination of wet preparation appearance, Gram staining reaction and the pH of the discharge. The wet preparation showed abundance of 'clue cells' [squamous epithelial cells whose surfaces were smothered with masses of micro-organisms], the pH of the saline preparation was found to vary between 5.0 - 5.6 [i.e. higher than normal pH of 3.0 - 4.5] when measured with a pH indicator paper (BDH, UK) and in a Gram stain of positive cases, the normal lactobacilli flora was almost or completely replaced with masses of Gram variable organisms.

Serological tests

Separated serum from blood samples were dispensed into two 3 ml volumes sterile plastic containers and used within two days for screening tests of HIV, syphilis, Hepatitis B surface Antigen and Chlamydia. Others were frozen for confirmatory tests. HIV antibody assay was carried out with Determine HIV 1/2 rapid test strips (Abbott laboratories-USA) and HIV 1/2 Stat-Pak assay (Chembio diagnostics – USA) methods according to the standard national HIV screening algorithm in Nigeria [8, 17]. These tests are qualitative membrane-based immuno assay techniques. All seropostive samples were further confirmed and differentiated into HIV 1 & 2 using immumo comb HIV 1 & 2 Biospots (Organics, Israel). Syphilis antibodies were tested for using syphilis ultra-rapid test strips (Clinotech Diagnostics – Canada). All reactive syphilis samples (containing *Treponema Pallidum* antibodies were further tested and confirmed with TPHA (Teco Diagnostics – USA). Hepatitis B surface antigen test was done using Hepatitis B surface antigen test strips (Acon^R laboratories–USA) while Chlamydia antibodies was tested using immunocomb Chlamydia Bivalent IgG test kit (Orgenics Medical Group – France), a semi quantitative and differential indirect solid phase enzyme immuno assay.

Data analysis

The proportions were calculated for various disease prevalences. The prevalence for STI was calculated by using patients with positive samples as numerator and the total numbers of patients enrolled in this study as denominator. The data generated from this study were presented using descriptive statistics. The data was subjected to statistical analysis using SPSS computer software version 19.0 for Windows to determine any significant relationship between infection rate, age and gender.

RESULTS

Of the two hundred (200) patients, 190 females and 10 males tested, 195 (97.5%) were infected with various STI agents and 5 (2.5%) had growth of *Staphylococcus aureus.*

Prevalence of STI pathogens

The prevalence of pathogens detected among attendees of Lead City University Medical Centre is presented in Table 2. It showed that *Candida albicans* had the highest percentage of infection occurrence [163(81.5%)], followed by, *Gardenella vaginalis (Bacterial vaginosis)* [23(11.5%)], *Trichomonas vaginalis* [4(2.0%)], *Treponema pallidum* (syphilis) [3(1.5%)], and *Nesseria gonorrhoeae* 2[(1.0%)]. Others were *Staphylococcus aureus* [5(2.5%)]. *Chlamydia trachomatis*, HBsAg, HCV and HIV were not detected (Table 2).

Table 2: Laboratory diagnosis, incidence of sexually transmitted infections pathogens

Isolate	Total n=200 No.* (%)
Candida albican	163 (81.5)
Gardnerella vaginalis (Bacterial vaginosis)	23 (11.5)
Trichomonas vaginalis	4 (2.0)
Trepanema palladium (Syphilis)	3 (1.5)
Neisseria gonorrheae	2 (1.0)
HIV	0 (0.0)
HBsAg	0 (0.0)
HCV	0 (0.0)
Chlamydia trachomatis	0 (0.0)
Staphylococcus aureus	5 (2.5)
Total	**195 (97.5)**

** = Multiple responses*

Prevalence of STI pathogens in relation to ages of patients

Table 3 shows prevalence of STI pathogens in relation to the ages of the attendees of Lead City University Medical Centre, Ibadan, Southwestern Nigeria. Table 3 shows the age specific distribution of STI pathogens among patients

in the study. Patients in the age group of 16-29 years had a higher prevalence rate of 183(98.9%) with all of them testing positive to one or more pathogens. While those in age group 30 years and above had a lower prevalence rate of 2(75.0%) with all of them testing positive to only *T. vaginalis* and *G. vaginalis* (Table 3). There was a high significant association (P<0.05) between age groups and infection acquisition.

Table 3: Prevalence of STI pathogens in relation to the ages of attendees of Lead City University Medical Centre, Ibadan, Southwestern Nigeria

Age Group (years)	No. Tested (%)	No. positive (%)
16-29	188(94.0)	186(98.9)
30 and above	12(6.0)	9(75.0)
Total	**200(100.0)**	**195(97.5)**

Prevalence of STI pathogens in relation to sex of patients

Table 4 shows prevalence of STI pathogens in relation to the sex of the attendees of Lead City University Medical Centre, Ibadan, Southwestern Nigeria. It showed the occurrence of infections by sex. Infection rates among these patients showed that females had higher infection rates 188(98.9%) than their male counterparts, 7(70.0%). Statistically, sex was significantly associated with infection occurrence (P<0.05).

Table 4: Prevalence of STI pathogens in relation to the sex of attendees of Lead City University Medical Centre, Ibadan, Southwestern Nigeria

Sex	No. Tested (%)	No. positive (%)
Males	10(5.0)	7(70.0)
Females	190(95.0)	188(98.9)
Total	**200(100.0)**	**195(97.5)**

Prevalence of STI pathogens in relation to marital status of patients

Table 5 shows prevalence of STI pathogens in relation to the marital status of the attendees of Lead City University Medical Centre, Ibadan, Southwestern Nigeria. It showed the occurrence of infections among these patients by marital status. Infection rates among these patients showed that married patients 7(70.0%) had lower infection rate compared to their single counterparts 188(98.9%). Statistically, marital status was significantly associated with infection occurrence (P<0.05).

Table 5: Prevalence of STI pathogens in relation to the marital status of attendees of Lead City University Medical Centre, Ibadan, Southwestern Nigeria

Marital status	No. Tested (%)	No. positive (%)
Married	10(5.0)	7(70.0)
Single	190(95.0)	188(98.9)
Total	**200(100.0)**	**195(97.5)**

DISCUSSION

The results of this study have demonstrated the endemicity and occurrence of significant levels of sexually transmitted infections in patients in Ibadan, Southwestern Nigeria. The STI isolates recovered from the subjects include; *Candida albicans*, 163(81.5%); *G. vaginalis*, 23(11.5%); *T. vaginalis*, 4(2.0%); *Trepanema palladium* (Syphilis), 3(1.5%); and *N. gonorrhea*e, 2(1.0%). However, *Staphylococcus aureus* 5(2.5%) was also recovered alongside. In this study, *Chlamydia trachomatis*, HBsAg, HCV and HIV were not detected. The prevalent rates of STIs were inversely associated with increase in age, sex and marital status.

The commonest organism encountered in this study was *Candida albicans* 163(81.5%). This finding is comparable with previous studies on STDs amongst pregnant and non-pregnant women in Illorin [18], Ife [19] and Jos, Nigeria [20]. The overall carrier rates of 81.5% observed for *C. albicans* is comparatively higher than the report of Donbraye-Emmanuel et al. [21] who documented a 65.4% for *C. albicans* among other Candida isolates and Hedayati and Shafiei [22] who documented a 29.7% *Candida albicans* in their study.

That *G. vaginalis* is particularly associated with bacterial vaginosis has been reported [23-25]. Though, no colonization *G. vaginalis* was found among subjects who presented with urethral itching/urethral discharges, candidiasis, gonococcal urethtitis, haematuria and infertility, PID and dysuria, and those who came for check ups; the involvement of microorganisms in infertility and pregnancy associated problems has long been widely described [24-25]. Although some workers have reported isolation of *G. vaginalis* from semen samples [26], its actual involvement in infertility and or pregnancy-related complications has not yet been very explicitly highlighted [24-

25]. Generally, it does appear that the probable role of *G. vaginalis* infection in infertility and pregnancy may not be contrary to the established adverse effects of sexually transmitted infections (STI) [24-25]. This calls for special attention since hitherto; *G. vaginalis* have not been among the targeted organisms suspected to be critical in infertility and pregnancy complications [24-25].

In this study, the prevalence of *T. vaginalis* was 2.0%. This lower compared to what was reported by other investigators. This value is lower than what was previously reported by other investigators. It is lower than the 6.0% prevalence of *T. vaginalis* reported by Donbraye et al. [27] in Ibadan and the 4.6% prevalence reported by Piperaki et al. [28] among women attending a Greek gynaecological hospital in Athens, Greece. De Lemos and Garcia-Zapata [29] detected *T. vaginalis* in 23.0% of the HVS from 39 pregnant women in their study. Some other investigators [30-31] have also reported a high rate in this type of population. Uneke et al. [32] reported 24.4% prevalence of *T. vaginalis* among HIV-seropositive Nigerian women using the wet mount preparations from high vaginal swab (HVS).

In this study, 1.5% prevalence of *Trepanema palladium* (Syphilis) was reported. VDRL test reactive strip samples found significant treponemal antibodies in 3 of them, absence of significant treponemal antibodies in other samples tested with VDRL strips may suggest a non syphilitic reagin antibody production or cross reactions with endemic treponemal infections such as yaws, (*T. pertenue*), pinta (*T. carateum*) or bejel (*T. endemicum*) [33]. The detection of these false positives clearly reveals the non specificity of the rapid test strips and the need for a specific confirmatory test for syphilis [34], especially as this is not the practice in most hospitals. The value reported for *Trepanema palladium* (Syphilis) in this study is lower compared to the findings of other investigators. This is lower than the 19.3% overall prevalence of syphilis reported by Sule et al. [35]. In African countries, prevalence of syphilis has been reported at 2.0% in Cotonou, 4.0% in Kisumu, 6.0% in Yaounde, and 14.0% in Ndola women [35]. The seroprevalence of 1.5% reported in this study was less than the 30% previously reported in Federal Medical Centre (FMC) Abakaliki, Ebonyi State, Nigeria [36]. This could be due to difference in sample size.

From the study, there was significant difference ($P<0.05$) in STI positivity and sex of subjects. It was observed that females (98.9%) had higher prevalence rate of STIs compared to the males (70.0%). This observation was in conformity with the finding of Hwang et al. [37] who reported that women had up to 4.5% higher prevalence of *T. pallidum* infection than men. This was also consistent with the findings of Todd et al. [38] who also reported higher prevalence of *T. pallidum* in women (9.1%) than in men (7.5%) in a rural African population and Sule et al. [35] who reported a higher prevalence of *T. pallidum* in females (22.4%) compared to the males (15.4%).

The 1.0% reported for *N. gonorrhoeae* in this study is lower than the value reported in other studies. Anorlu et al. [39] reported a prevalence of 1.4% for *Neisseria gonococcus* among women in Lagos University Teaching Hospital, Lagos, Nigeria. Aboyeji and Nwabuisi [18] reported prevalence of *N. gonorrhoeae* to be 1.3% among pregnant women in Ilorin, Nigeria. Sobngwi-Tambekou et al. [40] in an intention-to-treat analysis reported a prevalence rate of *N. gonorrhoeae* among intervention and control groups in South Africa to be 10.0% and 10.3% respectively. Usanga et al. [3] reported the prevalence of *N. gonorrhoeae* to be 5.2% among pregnant women in Calabar, Nigeria. White et al. [41] reported the prevalence of *N. gonorrhoeae* infection to be 9.8% among *T. vaginalis* positive female patients and 5.9% for *T. vaginalis* negative patients in USA. Mehta et al. [42] reported the incidence of infection due to *N. gonorrhoeae* to be 3.48 cases per 100 person-years among men in Kisumu, Kenya. Alli et al. [25] reported 25.0% for *N. gonorrhea*e in their study in an urban set-up. However, it is higher than the zero prevalence (0.0%) was reported by Rao et al. [43] in a rural set-up.

Neisseria gonorrhoeae was not isolated among older age groups (30 years and above) in this study. This could be attributed to abuse of broad spectrum antimicrobials which can easily be obtained over the counter of patent medicine dealers and pharmacy shops without authorized prescriptions. Non isolation of the organism could also be partly incidental arising from a pool of lightly infected population because of increase condom use and awareness of current incurable HIV pandemic in the world. However, *N. gonorrheae* was isolated in age groups 16-29 years of age [2(1.0%)]. This is comparable to what was reported by others who found rates ranging from 0.1% in Jos [20] to 0.5% in Kano, Nigeria [44].

Over-diagnosis and overtreatment expose more patients to unnecessary antibiotics which could result in the emergence of antimicrobial resistance. For example, over the past decade, strains of *N. gonorrhoeae* have been reported to develop high levels of resistance against several antimicrobial agents, previously used for the treatment of gonorrhea [14, 45]. Indian studies have also reported an increase in the spectrum and level of antibiotic resistance of *N. gonorrhoeae* isolates in the recent year compared to that seen previously [14, 46].

The prevalence rate of 0.0% recorded for HIV in this study deviates from that of the Federal Ministry of Health [47] Sentinel Study on HIV in Nigeria. Elsewhere, higher seroprevalence rate among different populations have been reported, for instance, 14.7% in Iquita-Oron in Akwa Ibom State; 13.0% in Makurdi (Benue State) and 10.0% in Saminka (Kaduna State) [14].

Amongst the different age groups investigated, STI distribution was highest in patients aged 16-29 years. The results of this survey are in agreement with generally observed fact that the incidence of STIs by the number of cases treated each year is highest among the 15-24 years old [11, 48-49]. Similarly, earlier data from studies by Aboyeji and Nwabuisi [18], Jombo *et al.* [20], Enabulele and Kemajou [50] and Adekunle *et al.* [51] reported that those in the age group of 15-30 years were the most infected (100%) by one STI or the other in their separate studies. The World Health Organization [4] concludes that these age groups (15-30years) are persons with the greatest sexual activity and that incidence decreases with age.

In our study, the peak age group of subjects positive for STIs ranged from 16 to 29 years (98.9%), and vast majority of them were female (98.9%), thus constituting the major bulk of the STI patients. This deviates from what was reported by Choudhry et al. [14] and Alli et al. [25]. This is a matter of concern in the context of HIV transmission as genital ulcer facilitates the transmission of and enhances susceptibility to HIV infection by sexual contact while nonulcerative STIs like gonorrhea and chlamydia increase shedding of the HIV virus in the genital tract by recruiting HIV-infected inflammatory cells as part of normal host response [14, 25].

Mehta et al. [44] also showed that risks for incident of STIs included an STI at enrollment, multiple sex partners within <30 days, and sexual intercourse during menses in the previous 6 months; and that condom use was protective. Mehta et al. [44] showed that circumcision of men in Kisumu, Kenya did not reduce their risk of acquiring these nonulcerative STIs. Improved STI control will require more-effective STI management, including partner treatment and behavioral risk reduction counseling.

The lowest infection rate occurred in married patients examined suggests that family life structure could be a major influence. The high rates observed in singles may suggest indiscrete sexual life patterns and multiple sexual partners for monetary rewards. This collaborates the finding by Harding *et al*. [52] that even though Nigerian students were knowledgeable about STIs, they were not deterred in engaging in risky behaviors. High STI rate among subjects in this study are clear signs that ways to reach those at risk must be developed and promotion of early recourse to health services, especially routine mandatory and early screening of all women for STDs cannot be over emphasized [3].

CONCLUSION

Fungal and bacterial STIs constitute the major burden of the STI clinic and enhance the susceptibility of an individual to acquire or transmit HIV through sexual contact. Though the syndromic approach has been a major step forward in rationalizing and improving the management of STIs, but syndromic algorithms have some shortcomings, and they need to be periodically reviewed and adapted to the epidemiological patterns of STIs in a given setting. Proper treatment of all STDs like use of correct and effective medicines, contact tracing and treatment of sexual partners and education of the general populace should not be overlooked in our locality

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