

# Genital Tract Infection: Prevalence and Causes in Women Attending Aminu Kano Teaching Hospital Kano, Nigeria

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## ABSTRACT

500 Samples of high vagina swabs (HVS), endocervical and urethral swabs were collected from women of reproductive age 15 to 49 years with suspected vaginitis at Aminu Kano Teaching Hospital, Kano, Nigeria. The specimens were investigated for the presence of *Candida albicans*, *Trichomonas vaginalis* and *Neisseria gonorrhoeae*. Organisms were found to be more prevalent among the age group 21 – 30 years and those women that husbands were drivers or motor mechanics. The total number of 210 (42.00%) subjects were found to be infected, with 121 (24.2%) having candidiasis, 13 (2.60%) having trichomoniasis, 48 (9.60 %) having staphylococcal infection, 9 (1.80 %) having streptococcal infections and 19 (3.80%) having other infections related to coliform-like organisms respectively. None of the subjects had gonorrhoea. It was concluded that sexual activities and low standard of hygiene are among factors aiding the spread of genital tract infection.

**Key Words:** Women, occurrences, genital tract infection

## 1. Introduction

Genital tract infections are diseases which attack the reproductive system of humans. The potential germs that cause these infections are bacteria, viruses, protozoans and fungi. In males these pathogens cause epididymitis, orchitis or inflammation of the urinary tract while in women they cause vaginitis, salpingitis, cervicitis, endometritis, oophoritis and puerperal sepsis (French et al, 2006).

Vaginitis an inflammation of the vagina described as one of the most common and serious female genital tract infections seen in many hospitals in developing countries (Yar'zever, 2010). Vaginitis together with other genital tract infections otherwise called venereal diseases are very common world wide but mostly in Africa and Asian countries, ranking among the top five diseases affecting both male and female (Azuzu and Osoba, 1990). The

pathogens responsible for these infections are *Neisseria gonorrhoeae*, *Trichomonas vaginalis* and *Candida* species. However, in most instances other organisms such as *Bacteroides* and *Mobiluncus* species are also responsible. Organisms that cause vaginitis include *Escherichia coli*, *Staphylococci*, *Streptococci*, haemolytic and anaerobic clostridia and *Herpes simplex* and quite other groups (Ogunbanjo, 1989). These organisms are delicate, been easily killed by drying or cooling below body temperatures with the reservoir exclusively in humans and the route of transmission is through lesions on the genitalia or secretions and discharges from the vagina. The transmission process include sexual behavior, the significant factor being sexual promiscuity and it is seen more in those who are most active especially those who indulge in frequent changes of partners (WHO, 2010)

Apart from direct contact, transmission may also occur through non- sexual contact like handling of infected hospital consumables by hospital staffs, using or exchanging cloths by adolescent and others (Lucas and Gilles, 2003).

Sexually transmitted diseases constitute a major problem world wide accounting for massive expenditure resulting in high morbidity and mortality with a considerable reservoir of infection existing among the female population more especially during pregnancy causing many problems both to the mother and the foetus (Schmid et al, 2001)

The continue increasing relationship between HIV infection and STDs or genital tract infection due to growing recognition that both ulcerative and non ulcerative STDs especially genital tract inflammation may facilitate the acquisition and transmission of HIV during sexual contact due to increase of target cells in the genital tract (WHO, 2010) Despite these health implications there is still little information on the prevalence of these genital tract infections in Kano particularly and Northern Nigeria in general. This study is aim at looking at the prevalence of these infections and how it can be reduce to avert the serious consequences cause by these genital tract pathogens.

## **2. Material and Methods**

### **2.1 Research Design**

The study was conducted using cross – sectional design in which only the prevalence of the disease was considered but not the incidence of the disease.

Using a cross-sectional study design, 500 women of reproductive age with different ages and social class, married and unmarried were selected from hospital record book of women that were consulted by doctors in out patient department. They were considered if their life histories include one or more of the following symptoms; previous experience of vaginal discharge, vulval pruritus, lowers abdominal and pelvic pain using accidental sampling

procedure. There after, they were stratified into A, B and C. (A: out patient department OPD n=276, B: Gynecological clinic n=144, and C: antenatal clinic n=80. They were subsequently subjected to laboratory investigations to determine whether they had genital tract infection according to CDC, (2007) classification.

## 2.2 Patients and Methods

Kano city *is* an ancient city with over 1500 years of history. It remains one of the oldest Hausa city-states that enjoy the eminent position of being a foremost centre of commerce, Islamic thought and culture. It is situated in the North-western region of Nigeria between latitude 10°30'N to 12°30'n and 7°30' to 9°25'N, is one of the 36 states of Nigeria. It has a population of 15 million heterogeneous inhabitants with over 90% been Hausa-Fulani tribe (National Population Commission, 2006). The urban-rural movement which Kano also experiences as a commercial, industrial and agricultural centre influences the pattern of sexual behaviour which ultimately results in rapid spread of sexually transmitted diseases, thus, Aminu Kano Teaching Hospital was chosen as the study area being one of the largest hospitals where different people from such a densely populated area seek medical attention.

The population of the study comprised of women of reproductive age attending Aminu Kano teaching hospital in Kano, northern Nigeria. It is the only foremost tertiary health institution in North-Western Nigeria. With a total of 1500 beds the hospital provides primary and secondary health services in addition to its statutory tertiary functions. The hospital also provides specialized health services to the contiguous states of Jigawa, Zamfara, Katsina, Yobe and Bauchi, out of which 500 women were selected using systematic random sampling from the hospital register of women booked for consultation, then stratified into out patient department OPD, gynecological and antenatal clinic. These women gave their informed consent to participate in the study after the purpose, procedure and benefits were carefully explained to them (WHO, 2007). They were constantly briefed about the procedure and the laboratory investigations as directed by the Management of Aminu Kano Teaching Hospital.

## 2.3 Selection Criteria

Subjects included women of reproductive age between the ages of 15 to 49 years who were booked for consultation by doctors in out patient department, after which they were stratified into (OPD, antenatal and gynecological clinics) for a period of nine months. Patients were considered symptomatic if their life histories include one or more of the following symptoms; previous experience of vaginal discharge, vulval pruritus, lowers abdominal and pelvic pain.

### **3. Data collection Procedure**

#### **3.1 Sample Collection**

Five hundred samples were collected from female subjects who attended the outpatient department of Aminu Kano teaching Hospital between March and September 2010 for consultation, Patients were considered symptomatic if their life histories include one or more of the following symptoms; previous experience of vaginal discharge, vulval pruritus, lower abdominal and Pelvic pain.

WHO/UNAIDS (2007) guidelines were followed in taken samples for high vaginal swabs, urethral swabs and cervical swabs from these women. Particular attention was paid to the external genitalia noting the nature of discharge, ulcerations and swellings. The specimens were collected under direct Vision and supervision of the author. To ensure compliance, the author supervised the laboratory processes under the assistance of the consultant in the department. By doing so, the chances of given out a wrong result was apparently reduced.

A sterile standard bacteriological swab was inserted into the urethra and gently moved from side to side and left in place for 10 seconds to allow the swab absorb materials from the urethra before it was removed using an unlubricated sterile speculum the vagina and cervix were exposed. Sterile Swabs were used to collect materials from the posterior fornix of the vagina. The endocervical swabs were taken in a similar way to the urethral after the cervical mucus had been removed with a cotton ball held with forceps. The swabs were immediately transported to the laboratory for examination and identification of organisms (Kanai, 2006).

#### **3.2 Microscopy**

Kanai, (2006) steps for wet preparation of the swabs was followed to prepared and examined microscopically at the laboratory for *Candida albicans* and motile trichomonads in a formal physiological saline mount.

Smears were also made from the swabs specimens and stained by Gram's Method in search of intracellular gram negative diplococci and also yeast (*Candida albicans*). A thin smear was made from each specimen. This was fixed to the slide by gentle heating ensuring that the slide was not over heated, because over heating or excessive heating of the slide would cause distortion of the cells especially fungal cells (Hay *et al*, 1992). After fixation the smear was flooded with crystal violet for 1 minute on the rack. It was then washed with lugol's iodine for 2 minutes and decolorized with 95% ethanol until the stain had ceased to come out of the preparation. ET was finally counter stained with neutral red and washed with water for 2 minutes. This was air-dried. *Candida* species or fungi are gram

positive

and therefore stained blue, while *Neisseria gonorrhoeal* stained red or pink as it is gram negative.

### 3.2.1 Culture

Blood agar and chocolate agar medium were used for the primary isolation of the organisms. This was in accordance with Duguid *et al* (2005) discoveries, that, both agar media were suitable for the primary isolation of fungi and *Neisseria gonorrhoea*

Blood agar was first prepared by suspending 40g of the blood agar base in 1 liter of distilled water. This was boiled to dissolve completely, and then it was sterilized by autoclaving at 121<sup>0</sup>C for 15 minutes. It was allowed to cool to 45-50<sup>0</sup>C at room temperature. Finally, 17% of sterile blood (defibrinated) was added, mixed and poured into sterile Petri dishes and left to solidify.

Chocolate agar was also prepared in a similar way, but in this case the blood was added to the blood agar base immediately after it was removed from the autoclave. It therefore contained heated blood which gave it the chocolate colour. It was also allowed to cool and then poured into Petri dishes and allowed to solidify.

The plates of both blood agar and chocolate agar were then streaked with the swab samples using a sterile wire loop and incubated at 37<sup>0</sup>C as described by Kirbybauer (1976) and Jones and Stokes (1975). The inoculated culture was inoculated in an atmosphere of 5 – 10% CO<sub>2</sub> provided by a lighted candle extinction jar for 24 to 28 hours. All procedures were performed under sterile conditions.

After inoculation, colonial growths on the agar plates were gently touched with a sterilized wire loop and were transferred to the glass slides and mixed gently in 1 -2 drops of water to dilute their concentration. The smear was made to cover an area of 3cm x 1cm of the slide (Khron *et al*, 2006). The slides were then Gram stained. Infection with *Candida* was diagnosed by culture on chocolate agar in addition to the microscopically examination of the wet preparation already performed.

### 3.2.2 Biochemical Test

*C. albicans* was also identified by simple germ tube formation. This was done as described by Cheesbrough (2005) and Jones and Stokes (2002). The test was carried out by pipetting 0.5ml of human or animal serum, and this was put a plastic test tube of 6 x 50cm, using a sterile wire loop. The serum was then inoculated with yeast colonies from the culture medium. These tubes were incubated at 37<sup>0</sup>C for 3 hours. The culture was transferred onto glass slide and

covered with cover slip. Finally it was examined under the microscope for germ tube formation under 10X and 40X objectives.

#### 4. Results

Five hundred women who were patients of the outpatient, Gynecological and antenatal clinics of the Aminu Kano Teaching Hospital, Kano, Nigeria, were examined for genital tract infections. It is shown in Table 1 that 210 (42.00%) of the patients were found to be infected, 133 (40.94%) of the 276 patients of the Outpatient Department, 49 (34.03%) of the 144 patients of the Gynecological Department and 48 (60.00%) of the 80 patients attending the Antenatal Clinics of the hospital. Also 192 (38.40%) of the 500 patients were previously infected, and these included 95 (34.42%) of the 276 OPD patients, 55(38.19%) of the 144 gynaecology (GYN) patients, and 12 (52.50%) of the 80 antenatal (ANT) patients.

The infected 210 (42.00%) of the 500 patients examined harbored five different types of infections, including 121 (24.20%) who had *Candida albicans*, 48 (9.60%) having Staphylococcus infections, 13 (2.60%) with *Trichomonas vaginalis* and 19 (3.80%) harboring coliform-like organisms in their genital tracts (GI) (Table 2).

Table 3, shown that 205 and 71 patients of the 276 patients examined at OPD were symptomatic and asymptomatic respectively. Out of 205 symptomatic 104 (50.75%) had infections, while out of 71 asymptomatics, 9 (12.68%) had infections. In the GYN clinic, 43 (41.75%) and 6 (14.63%) of the 103 and 41 symptomatic and asymptomatic patients harbored infections in their genital tract. Also, 35 (85.37%) of the 41 symptomatic in the ANC Clinic had similar infections.

Table 4 shows 500 patients were classified in relation to the occupations of their husbands 214 of them had husbands who were Civil Servants (Class 1), 113 had husbands who were Businessmen (Class 11), the husbands of 79 and 57 of them were Engineers, Consultants, Private Practitioners and Mechanics, Drivers and painters respectively (Class III and IV) while one patient has a husband who was a student (Class V). 36 of them who were unmarried were placed as singles. Of these, 85 (39.72%) in class 1, 48 (42.48%) in class 11, 39 (49.37%) in class III, 21 (3.64%) and 16 (44.44%) in the singles class were found, to harbor infections respectively. The only patient in Class V was also found to harbor infection.

The prevalence of infection in the 500 patients in relation to their ages is as shown below, 161 (32.20%) of the patients in the 21-30 years group, 30 (6.0%) patients in the 11-20 years, 18 (3.6%) in the 31-40 years group and 1 (0.2%) in the 41-50 years group harbored various infections.

Similarly, table 5 presents prevalence of the infections in relation to the age groups of the patients in singles class showed that patients in the age group 11-20 years had the highest infections rate (30.55%). Patients in the age group 21-30 and 31-40 had infections rates of 11.11% and 2.78% respectively.

Eight patients in the different age groups had double infections of the organisms encountered in this study. While one patient aged 21 years had a triple in infection of *C. albicans*, *T. vaginalis* and coliform-like organisms.

It is shown in Table 1 that, of the 210 infected women attending the antenatal clinics had the highest infection rate of 60.00% when compared to patients from the other two clinics. Also out of the 500 patients seen, 192 (38.40%) were previously infected with antenatal patients having the highest infection rate of 52.50%. This therefore shows that, pregnant women may be more vulnerable to vaginitis.

## 5. Discussion

With the 500 selected patients attending Outpatient department, Gynecological and Antenatal clinics, 210 infected women attending the antenatal clinics had the highest infection rate of 60.00% when compared to patients from the other two clinics. Also out of the 500 patients seen, 192 (38.40%) were previously infected with antenatal patients having the highest infection rate of 52.50%. This therefore shows that, pregnant women may be more vulnerable to vaginitis due to their present condition.

The mean age of patients was found to be 29.4 years; this is slightly lower than what was observed by Adetoro *et al* (1991) of 29.70 years. Most patients from whom organisms were grown were between the age 11-20 years and 21-30 years with an infection rate of 47.62% and 42.15% respectively and which is similar to what was observed by Otubu *et al* (1991) and Adetoro *et al* (1991). The result therefore showed that young women were particularly vulnerable as they belonged to an age group where sexual activity is at its peak, as observed by Sogbetun *et al* (1977) and Osoba *et al* (1984). Also the religious beliefs of the community encouraged polygamy and these could be a contributory factor since the husband has to sleep with each woman and the husband or any of the wives might acquire STD's resulting in the infection of the entire household. This will certainly increase the rate of spread of transmission. The least infection was observed in women 41-50 years with an infection rate of 25.00% and this can be considered as secondary bacterial infection following atrophic vaginitis as described by Bailey (1975).

Also as shown in table 1, *C. albicans* was the most prevalent organism among the age group 11-20 years, 21-30 years and 31-40 years, while streptococcal infection was the least prevalent organism among the various age groups. This high prevalence of *C. albicans* can be related, to the fact that young women are particularly vulnerable to *C.*

*albicans* as they fall under the age group where sexual activity is at its peak. Another contributing factor of vulvovaginal candidiasis's (VVC) is the use of oral contraceptives. This is true as revealed by Edmund *et al* (1992), who showed that *C.albicans* infections is more common among sexually active women aged 15-20 years, women using intra-uterin contraceptive devices (IUCD's) are found to be more associated with *C.albicans*. It was also observed by Han's (1983), that oral contraceptive devices contain hormones known as oestrogen which was found to increase the level of glycongen in the vaginal area and allow *C.albicans* to flourish. This hormone as in the contraceptive observed by Han's (1983) increases incidence of vaginal candidiasis by 20-40%, but even among women in the range of 15-34 years, apart from oral contraceptives and sexual activities, many other factors such as pregnancy and the use of chemotherapeutic agents were considered as an important factor that predisposed women to *C. albicans* infections. Jacob (1990) found out that antibiotic particularly those with broad spectrum activity are very common precipitators of commensally bacteria e.g. lactobacilli. After antibiotic use, the rate of vaginal yeast colonization and symptomatic episode of candidiasis increased allowing *Candida* to flourish.

Studies also show that other factors that predispose to vaginal candidiasis are the use of nylon underwear and tight clothing especially in obese women, making the skin and genital mucosal surface much more susceptible to *Candida* infections. Minor skin damage induces by skin sensitizers such as vaginal sprays, douches, deodorants and perfumed tampons may predispose women to *C. albicans* by disrupting the normal vaginal microflora. Also, diabetes mellitus when poorly controlled increases glucose concentrations in the urine and the vaginal secretions and this favors yeast proliferation (Robin, 1990; Jacob, 1990).

Apart from the factors mentioned above, the high prevalence of *C. albicans* in this study could be related to the type of humid environment in which the subjects live, which provides conducive climate conditions for the growth of the fungus.

Consequently, *T. Vaginalis* had the highest prevalent rate among the age group 11-20 years with an infection rate of 4.76%, and this is not consistent with Ukoli (1970) study that shows trichomoniasis as been rare among girls and virgins, but more at ages of 20-40 years. The relative high prevalence of trichomoniasis among this age group (4.26%) in this study can be related to poor hygiene and high sexual activity, since they fall under the age group where sexual activity is at its peak.

As seen in table 2, *C. albicans* had the highest prevalence rate of 24.20% and this support the view that vulvovaginal candidiasis accounts for about one quater of vaginitis cases seen in practice (Fleury, 1981). Antenatal patients were

found to have the highest infection rate of 46.25% and this account from more than half of the infected antenatal patients (60.00%). This agreed with Balcy (1975) where it was stated that *Candida* occurs in 6-28% of women but its incidence is double in pregnant women. The results, therefore, clearly support the view that pregnancy predisposes to candidiasis probably due to high acidity in the vagina which encourages the rapid growth of fungal organisms. A test of contingency for the prevalence of *C. albicans* in the three clinics showed a significant difference ( $P < 0.001$ ).

Although antenatal patients have the highest infection rate of 3.75% in the case of trichomoniasis, a contingency analysis of *T. vaginalis* for the three clinics showed no significant difference in the prevalence of the infections in the three clinics. This indicates that the infections are distributed in these clinics almost at the same rate. ( $P < 0.001$ ). (See table 2).

Table 2 also shows that, 48 (9.60%) patients were infected with *Staphylococcus*, indicating that the individuals might be infected with the *Staphylococcus* present in their genital tract or that which make up part of the normal microflora of genito urinary tract.

Also the prevalence of Coliform-like organisms in this study was much lower, for example, prevalence rate of 5.07% was observed among patients attending the outpatient department. A contingency analysis on the prevalence of Coliform-like organisms in the three clinics, showed no significant difference in the distribution of the organisms between the three clinics.

Most patients complained of vaginal discharge, itching or pelvic pain or both. The results obtained in table 3, clearly indicate that vaginitis is a symptomatic case, in that more than half of the patients from each of the three clinics were symptomatic. For example, 104 patients from the OPD were symptomatic with an infection of 50.75% while only 9 (12.68%) were asymptomatic. Similarly patients from the antenatal clinics had the highest symptomatic case with an infection rate of 85.37% when compared to 33.33% infection rate of the asymptomatic patients.

It was also observed that patients who complained of vaginal discharge and pruritus mostly harbored *C. albicans*. This shows that candidiasis was the most symptomatic of all cases of vaginitis in this study with antenatal patients having the highest infection rate of (60.98%), consistent with Otubu *et al* (1991), but the asymptomatic case of 30.77% was similar to the 33.1% reported in Ibadan Osoba and Onifade (1982). The prevalence of *C. albicans* as published by other researchers are 94% (Bello, 1983), 13.4% Adetoro *et al*, 1991), 2.20% (Konge *et al*, 1991), 6.9% (Bello *et al*, 1991) and 12% - 13% among asymptomatic female Osabo and Onifade, 1982).

According to table 3, all patients suffering from trichomoniasis were symptomatic with those from the antenatal clinic having the highest prevalent rate of (7.32%). The least prevalent rate of symptomatic trichomoniasis of 3.4% among the patients attending OPD was similar to what was observed by other studies 2.52% (Konje *et al*, 1991) and 3.2 (Adetoro *et al*, 1991). Thus, the result obtained clearly agrees with Jones (1990), that “about 50% of women suffering from vaginitis due to *T. vaginalis* are symptomatic while only 10% are asymptomatic”, while in this case, none were asymptomatic.

Most patients suffering from staphylococcal infection were symptomatic, antenatal patients having the highest infection rate of 14.63%. Similarly, patients suffering from streptococcal infections were symptomatic with gynecological patients having the highest prevalence of 3.88%. None of the antenatal patients were found to harbor coliform-like organisms. The highest infection rate of 5.85% was observed among asymptomatic women of OPD.

Table 4 shows that social class I constitute the highest number of patients seen during the course of this study with 85 infected patients, and this may be related to high level of awareness existing among this class, class IV constitute the lowest number of patients seen and this may also be related to ignorance or low level of awareness.

Similarly it was observed that there was no significant difference in the distribution of organisms among various social classes, indicating that the infections were distributed among these women at almost the same rate and the observation does not agree with observations made by Otubu *et al* (1991) which showed that the distribution of infections were more prevalent in social class.

Patients that belong to social class II and III had the highest infection rate of 42.48% and 49.32% respectively. This high prevalence may be related to high sexual promiscuity apart from their level of awareness. The low prevalent rate of 3.64% existing among social class IV may also be related to their low level of awareness.

Out of the 36 unmarried patients, 16 (44.44%) were infected which was above the 9.1% observed by Adetoro *et al* (1991). Patients belonging to age group 21-30 years had the highest infection rate of 57.14%. Sexual promiscuity may be considered as a factor here. The relatively high prevalence among age group 11-20 years may be related to inadequate perineal hygiene existing among this age group.

## 6. Conclusion

It was observed that 210 (42%) out of 500 patients suffered from one form of vaginitis or the other. *C. albicans* was found to be the most prevalent organism with a prevalence rate of 24.20%, streptococcal infections had the least prevalent rate of 1.80%.

From the studies conducted it was also clear that most patients suffering from vaginitis are symptomatic. Also the prevalence of organisms was found to be closely related to the level of awareness of the patients seen, high sexual activity and low standard of hygiene. Most patients suffering from trichomoniasis were found to have multiple infections, which clearly indicate that, patients suffering from trichomoniasis should always be screened for other sexually transmitted diseases.

Conditions that predispose to the onset of vaginitis especially candidiasis include oral contraceptive, pregnancy, antibiotic therapy, diabetes mellitus and cervical discharge, oral factors most implicated are poor hygiene, worn macerated skin, minor skin damage, sexual intercourse and pH of the vaginal area combined with the humid atmospheric conditions. Multiple sex partners as in polygamous families found in this study can be important factor in transmitting these diseases. This same condition can be said to be responsible for transmission of *Staphylococcus*, *Streptococcus* and other coliform-like infections. The high prevalent rate of *Staphylococcus* may be due to the practice of reporting susceptibility of normal skin flora which only misinform clinicians and also encourage unscrupulous patients to buy inappropriate and most often dangerous drugs, this such act should be discourage. It is obvious from the study conducted that the level of vaginitis among women of various age groups is undesirable and its affect social and economic problems among the study population.

#### **7. Limitations and implications for further research**

This study did not take into consideration the fact that some of the women that were respondents were on antibiotics prescribed from other hospitals attended before and majority had already clean up themselves before the samples were taken. Further studies should take these short comings into account. Furthermore, it will be important in future studies to include the husbands of these respondents so that better management can be done to control the rate of infection in Kano State.

#### **8. Conflict of interests**

None declared.

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**Table 1: Overall Infection rates in Women Attending Aminu Kano teaching Hospital, Kano Nigeria**

PRESENT STUDY			PREVIOUS STUDY		
Clinic	No. of Patients examined	Number Infected	Infection Rate	Number Previously Infected	Infection Rate
OPD	276	113	40.94	95	34.42
GYN	144	49	34.03	55	38.19
ANT	80	48	60.00	42	52.50
Total	500	210	42.00	192	38.40

**KEY**

OPD = Outpatient Clinic; GYN = Gynecological Clinic; ANT = Antenatal Clinic

Source: Computed from laboratory results collected at the facility level (2010)

**Table 2: Prevalence of Microorganisms in Women Attending Aminu Kano Teaching Hospital, Kano, Nigeria**

Microorganisms Encountered	OPD (n=276)		GYN (n=144)		ANT (n=80)		Total (n=500)	
	No. Infected	Infection rate (%)	No. Infected	Infection rate (%)	No. Infected	Infection rate (%)	No. Infected	Infection rate (%)
<i>Candida albicans</i>	62	22.46	22	15.28	37	46.25	121	24.20
<i>Staphylococcus</i>	26	9.45	15	10.42	7	8.75	48	9.60
<i>Streptococcus</i>	4	1.45	4	2.78	1	1.25	9	1.80
<i>Trichomonas vaginalis</i>	7	2.54	3	2.80	3	3.75	13	2.60
<i>Coliform-like organism</i>	14	5.07	5	3.47	0	0.00	19	3.80
Total	113	40.94	49	34.03	48	60.00	210	42.00

Source: Computed from laboratory results collected at the facility level (2010)

**Table 3: Prevalence of Organisms in Symptomatic and Asymptomatic Women Attending Aminu Kano teaching Hospital, Kano, Nigeria**

Class of Women in the Clinics	C. albicans		T. vaginalis		Staphylococcus		Streptococcus		Coliform-like organism		Total		
	No. of Infected	Infection rate (%)	No. of Infected	Infection rate (%)	No. of Infected	Infection rate (%)							
<b>OPD</b>													
SYM (n=205)	57	27.80	7	3.4	25	12.20	3	1.43	12	5.58	104	50.75	
ASYM (n=71)	5	7.04	0	0	1	1.14	1	1.41	2	2.82	9	12.68	
<b>Total</b>	<b>276</b>	<b>62</b>	<b>22.46</b>	<b>7</b>	<b>2.54</b>	<b>26</b>	<b>9.42</b>	<b>4</b>	<b>1.45</b>	<b>14</b>	<b>5.07</b>	<b>113</b>	<b>40.94</b>
<b>GYN</b>													
SYM (n=103)	18	17.48	3	2.91	13	12.62	4	3.88	5	4.85	43	41.75	
ASYM (n=41)	4	9.76	0	0	2	2.88	0	0	0	0	6	14.63	
<b>Total</b>	<b>144</b>	<b>22</b>	<b>15.28</b>	<b>3</b>	<b>2.08</b>	<b>15</b>	<b>10.42</b>	<b>4</b>	<b>2.8</b>	<b>5</b>	<b>3.47</b>	<b>49</b>	<b>34.03</b>
<b>ANT</b>													
ASM (n=41)	25	60.98	3	7.32	6	14.63	1	2.44	0	0	35	85.37	
ASYM (n=39)	12	30.77	0	0	1	2.56	0	0	0	0	13	33.33	
<b>Total</b>	<b>80</b>	<b>37</b>	<b>46.25</b>	<b>3</b>	<b>3.75</b>	<b>7</b>	<b>8.75</b>	<b>1</b>	<b>1.25</b>	<b>0</b>	<b>0</b>	<b>48</b>	<b>60.00</b>

KEY: OPD = Outpatient Clinic ; SYM = Symptomatic; GYN = Gynecological Clinic; ASYM = Asymptomatic; ANT = Antenatal Clinic  
 Source: Computed from laboratory results collected at the facility level (2010)

**Table 4: Prevalence of organisms by Social Class (Husband's occupation) of 464 married and 36 unmarried patients, attending OPD, GYN and ANT clinics of Aminu Kano Teaching Hospital, Kano Nigeria**

Social Class	C. albicans		T. vaginalis		Staphylococcus		Streptococcus		Coliform-like organism		Total	
	No. of Infected	Infection rate (%)	No. of Infected	Infection rate (%)	No. of Infected	Infection rate (%)						
I (n=214)	47	21.96	4	1.87	20	9.35	8	3.74	6	2.80	85	39.72
II (n=113)	28	24.78	4	3.53	10	8.85	1	0.85	5	4.42	48	42.48
III (n=79)	25	31.65	3	3.79	9	11.39	0	0	2	2.53	39	49.37
IV (n=57)	8	14.04	0	0	9	15.79	0	0	4	7.02	21	3.64
V (n=1)	1	100	0	0	0	0	0	0	0	0	1	100
Single (n=36)	12	33.3	2	5.56	0	0	0	0	2	5.56	16	44.44
<b>Total</b>	<b>121</b>	<b>24.20</b>	<b>13</b>	<b>2.60</b>	<b>48</b>	<b>9.60</b>	<b>9</b>	<b>1.80</b>	<b>19</b>	<b>3.80</b>	<b>210</b>	<b>42.00</b>

**KEY**

- Class I - Patients whose husband's occupation are civil servant
- II - Patients whose husband's occupation are Businessmen
- III - Patients whose husband's occupation are Engineers, consultants, private practitioners
- IV - Patients whose husband's occupation are Mechanic, Drivers, Painters, Traders
- V - Patients whose husband's occupation is student

Source: Computed from laboratory results collected at the facility level (2010)

**Table 5: Prevalence of organisms by Age Group for unmarried/single patients attending outpatient, Gynecological and antenatal clinics**

Age Group	Number of patients examined	<i>C. albicans</i>		<i>T. vaginalis</i>		<i>Staphylococcus</i>		<i>Streptococcus</i>		Coliform-like organism		Total	
		No. of Infected	Infection rate(%)	No. of Infected	Infection rate(%)	No. of Infected	Infection rate(%)	No. of Infected	Infection rate(%)	No. of Infected	Infection rate(%)	No. of Infected	Infection rate(%)
5-10	3	0	0	0	0	0	0	0	0	0	0	0	0
11-20	24	9	37.50	1	4.17	0	0	0	0	1	4.17	11	45.83
21-30	7	2	28.57	1	14.29	0	0	0	0	1	14.29	4	57.14
31-40	2	1	50.00	0	0	0	0	0	0	0	0	1	50.00
41-50	0	0	0	0	0	0	0	0	0	0	0	0	0
51-60	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>36</b>	<b>12</b>	<b>33.33</b>	<b>2</b>	<b>5.56</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5.56</b>	<b>16</b>	<b>44.44</b>

Source: Computed from laboratory results collected at the facility level (2010)

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