ASYMPTOMATIC GENITAL INFECTIONAMONG PREGNANT WOMEN IN SAGAMU, NIGERIA.

*Sule-Odu AO[1,2], Akadri AA[2], Adeiyi TO[2], Sotunsa JO[2], Durojaiye BO[2], Oluwole AA[2]

[1]Faculty of Clinical Sciences, OlabisiOnabanjo University, Sagamu, Ogun State, Nigeria.
[2]Department of Obstetrics and Gynaecology, OlabisiOnabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria.

ABSTRACT

Background: Untreated genital tract infections in pregnancy may be associated with adverse effects on foetal and maternal health leading to poor pregnancy outcome.

AIM: The aim of this study is to determine the prevalence and microbial isolates associated with asymptomatic genital infectionsin pregnancy.

Methodology: This was a cross-sectional study on 252 pregnant women attending their first antenatal clinic. Data on socio-demographic characteristics of study participants was recorded. Microbial culture was carried out on High Vaginal and Endocervical swab samples. Statistical analysis was done using IBM-SPSS Windows version 20.

Results: The prevalence of asymptomatic genital infection was 44.8%. Multiparity had statistically significant association with increased prevalence of the condition. *Candida albicans* and *Staphylococcus aureus* were the most predominant microbial isolates. Erythromycin and Levofloxacin were the most sensitive antibiotics against the bacterial isolates.

Conclusion: This prevalence of asymptomatic genital infectionsis high in pregnant women in Sagamu. It is recommended that routine screening and treatment of these infections should be included in the antenatal clinic services offered to pregnant women so as to prevent the adverse foetal and maternal effects associated with asymptomatic genital infections in pregnancy.

Keywords: Genital infection, Pregnancy, Asymptomatic, Sagamu.

INTRODUCTION

Genital tract infections are important public health issues in both developed and developing countries[1]. Women with these infections may either be asymptomatic or they may present with symptoms such as external and internal vagina irritation, itching, discomfort, unpleasant odour, profuse vaginal discharge and dyspareunia[2]. There is a suggestion that genital tract infections are common in pregnancy[2,3]. Normally there is increased vaginal transudate during pregnancy due to increased vascularity and hyperestrogenism. This discharge is however mucoid in nature and nonirritating[2].Normal cervicovaginal flora plays a crucial role in the defense against the growth and

Correspondence: Prof AO Sule-Odu
Department of Obstetrics &Gynaecology, Faculty of Clinical Sciences,
ObafemiAwolowo College of Health Sciences, OlabisiOnabanjo University,
PMB 2022, Sagamu, Ogun State,
Nigeria.
Email: adewalesuleodu@yahoo.com

ascension of pathogens. Lactobacilli exercise a local defense mechanism due to its production of lactic acid and hydrogen peroxide[4]. During pregnancy, an imbalance in the vaginal flora favors the colonization of the urogenital system by microorganisms which can complicate the pregnancy[5].Genital tract infections are also associated with poor socioeconomic status and immunodeficiency, which are more common in under-resourced settings compared with resource-rich settings[6].

The lower genital tract during pregnancy contains a complex array of microbes that normally inhabit or cause infections in few instances[7].*Candida albicans* has been reported as the predominant organism associated with asymptomatic genital tract infections in pregnancy[8]. Other associated organisms include *Escherichia coli, Klebsiella, Aerobacter, Proteus, Providencia*, *Pseudomonas*, *Facultative anaerobes,Staphylococci* and *Streptococci*[9]. Significant association of some lower genital tract organisms and infections with preterm birth or preterm rupture of the membrane has been reported[10]. Untreated genital tract infections in pregnant women have also been associated with foetal loss, low birth weight and neonatal eye and lung damage[11].It has been suggested that routine screening for clinically important pathogens should be part of antenatal clinic services[11]. Screening for cervical infections in pregnant women is also considered as an essential indicator of public health[12]. Treatment of women with genital tract infections may help prevent the adverse maternal and fetal outcomes associated with the condition.

The aim of this study is to determine the prevalence and microbial isolates associated with asymptomatic genital infectionsin pregnancy. This will enable us to assess the magnitude of the problem and to implement strategies that will help in mitigating the adverse maternal and foetal effects.

MATERIALS AND METHODS

This was a prospective cross-sectional study conducted at the antenatal clinic of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria. A total of 252 pregnant women were recruited for the study. These subjects were recruited consecutively over a 3 month period from 1st August to 31st October 2012. The study population included all women who presented to the antenatal clinic for booking within the study period. Women who refused to give consent, HIV positive women and those who presented with symptoms of genital tract infections such as external and internal vagina irritation, itching, discomfort, unpleasant odour, profuse vaginal discharge, dyspareunia and fever were excluded from the study. In addition women who had used any antimicrobial agent for any reason at least two weeks prior to the study were also excluded from the study. Every eligible and willing participant was given detailed information about the study and informed consent was obtained.

DATA COLLECTION

A data capture sheet was administered to the women by the authors. Information obtained included the age, occupation, level of education, parity and gestational age of study participants. The high vaginal and endocervical swab results were also recorded on the data capture sheet.

Sample Collection and Processing

Consenting women were placed in dorsal position and high vaginal and endocervical swabs were obtained from them by the researchers with the assistance of nurses who acted as chaperones. The swab sticks were streaked onto saboraud-dextrose agar, blood agar, McConkey agar and Chocolate agar plates in duplicates. One group of the inoculated plates was incubated aerobically at 37°C for 24 hours while the second group of plates was

incubated anaerobically for 72 hours. Presence of at least 10^5 colony forming units on media plates was regarded as significant growth. Isolates were identified to specie level using standard methods and the antimicrobial sensitivity pattern determined by using Kirby- Bauer disc dilution technique[13]. Pregnant women that were diagnosed with asymptomatic genital infections were treated based on the sensitivity pattern.

Data Management and Analysis

Data was analyzed using IBM-SPSS windows version 20. Continuous variables were summarized using descriptive statistics such as mean and standard deviation at 95% confidence interval. Categorical variables were summarized by frequencies and percentages. The influence of socio-demographic characteristics of study participants on the prevalence of asymptomatic genital infection was assessed using chi-square test. A p-value less than 0.05 was deemed statistically significant.

RESULTS

Out of a total of 252 pregnant women examined for asymptomatic genital infection, 113 had positive cultures for microorganisms in their high vaginal or endocervical swabs giving a prevalence of 44.8% for asymptomatic genital infection in pregnancy. The mean age of the study participants was 30.8 ± 5.7 years with a range of 18 - 44 years. The mean gestational age was 20.1 ± 7.3 weeks with a range of 10 – 35 weeks.

The distribution of the socio-demographic characteristics of the study participants is shown on Table 1. Majority (50.0%) of the participants were in the 30-39 age group. One hundred and forty seven (58.3%) of the study participants had tertiary level of education. Majority of the participants were traders (23.8%) and civil servant (22.6%). As regards parity, majority (45.2%) of participants were nulliparous, 99(39.3%) were either para 1or 2, 36(14.3%) were either para 3 or 4 and only 3(1.2%) were grandmultiparous. Majority (59.5%) of the study participants had gestational ages between 14 and 28 weeks.

The distribution of isolates is depicted on Table 2. The most predominant organism isolated was *Candida albicans* which accounted for 54.9% of isolates. *Staphylococcus aureus* was the most predominant bacterial isolate accounting for26.5% of isolates while the least predominant bacterial isolate was *Proteus species* accounting for 2.6% of isolates.

Table 3 shows the prevalence of asymptomatic genital infection in relation to socio-demographic characteristics of participants. The highest prevalence of asymptomatic genital infection (47.6%) was found in women who were in the 30-39 years age group. None of the 3 participants who were aged less than 20 years had positive culture indicating genital infection.

The highest prevalence of asymptomatic genital infection (49.0%) occurred in women who attained tertiary level of education while the lowest prevalence (38.1%) was in those that attained secondary level of education. The age and the level of education of participants had no statistically significant association with the prevalence of asymptomatic genital infection. The prevalence of asymptomatic genital infection in nulliparous women was 34.2%. Women who had a parity of either 1 or 2 had a prevalence of 57.6% while those with parity of either 3 or 4 had prevalence of 47.2%. None of the grandmultiparous women had genital infection. The pattern of association between parity and prevalence of asymptomatic genital infection was noted to be statistically significant (X^2= 14.221; p = 0.001). Women with gestational ages greater than 28 weeks had the highest prevalence of asymptomatic genital infection (60.0%). Women with gestational ages of between 14 and 28 weeks

had a prevalence of 43.3% while those with gestational ages less than 14 weeks had a prevalence of 36.8%. The association between the gestational age of participants and the prevalence of asymptomatic genital infection was not statistically significant.

The antibiotic sensitivity pattern of isolates is shown in Table 4. Erythromycin and Levofloxacin were the most sensitive antibiotics against the bacterial isolates. Each of these antibiotics was sensitive against 47.1% of the isolates. The least sensitive antibiotics were Co-trimoxazole and chloramphenicol.

DISCUSSION

The prevalence of asymptomatic genital infection in this study was 44.8%. This value is consistent with findings from a review article which reported a prevalence value of between 40%-54%[11]. Akerele et al however reported a prevalence rate of 60% in Benin[8]. A prevalence rate of 28% was reported in a similar study done in India[7]. The wide variation in the prevalence rate of asymptomatic genital infections in different geographical locations may be due to differences in socio-economic status, douching practices, hygienic practices and sexual practices of women the various geographical locations[14,15]. Low socioeconomic status and poor hygiene have been identified as a risk factor for asymptomatic genital infection[2].

The most predominant organism associated with asymptomatic genital infection was *candidaalbicans*accounting for 54.9% of isolates. Similar findings were reported in previous studies[2,3,8]. *Staphylococcus aureus* was the most predominant bacterial organism identified in this study to be associated with asymptomatic genital infection accounting for 26.5% of isolates. Similar pattern was reported in Benin[8]. It is also of note that *staphylococcus aureus* was the predominant bacterial isolate associated with asymptomatic bacteriuria among a cohort of pregnant women in Sagamu[16]. As a result of lack of facilities in our laboratory, the study design could not detect other clinically important pathogens such as *Chlamydia trachomatis.*

The highest prevalence of asymptomatic genital infection was found in women in the age range 30-39 years. A similar pattern was reported by Nwadioha et al in Jos,Nigeria[17]. The prevalence of asymptomatic genital infection was highest in women who attained tertiary level of education. This was contrary to findings from a previous study which reported the highest prevalence of asymptomatic genital infection in women with low level of education[2]. It is however of note that only 8.3% of the subjects of this study had low level of education; this may be responsible for the findings in this study.

The prevalence of asymptomatic genital infections was noted to increase with increasing parity. This is similar to findings from previous studies[2,18]. The pattern of association between parity of respondents and the prevalence of asymptomatic genital infection was noted to be statistically significant. It has been suggested that the increased coital frequency in multiparouswomen results in reduction in the physiological barrier in the vagina, resulting in overgrowth of normal commensals and this leads to increased risk of asymptomatic genital infection[19]. The prevalence of asymptomatic genital infection in pregnancy was noted to increase with increasing gestational age. This is similar to findingsfrom previous studies[3,18,20]. The pattern of association between gestational age of women and the prevalence of asymptomatic genital infection was however not statistically significant. The increase in vaginal secretions, difficulty in movement and therefore less attention to personal hygiene could be considered as the main reasons for

increased risk of genital infections in women with advanced gestational age[3].

Our results show that *Staphylococcusaureus*isolates which were the most predominant bacterial isolates were highly sensitive to Erythromycin, fairly sensitive to Augmentin and highly resistant to Co-trimoxazole. A similar study carried out in Benin also revealed that *Staphylococcusaureus*isolates were highly sensitive toAugmentin5It is of note that no antibiotic was found to be effective against all bacterial isolates cultured in this study.Co-trimoxazole which was the least sensitive antibiotic inthis study was found to be very effective against all bacterial isolates cultured in a similar study5. This result indicates that the antibiotic sensitivity pattern of isolates associated with asymptomatic gentital infection in pregnancy may vary significantly among different obstetric populations.

CONCLUSION

This study demonstrated a high prevalence of asymptomatic genital infections among pregnant women in Sagamu. It has also shown that *candidaalbicans* and *staphylococcus aureus* were the most predominant organisms associated with the condition. It is recommended that routine screening and treatment of these infections should be included in the antenatal clinic services offered to pregnant women so as to prevent the adverse foetal and maternal effects associated with asymptomatic genital infections in pregnancy.

Declaration of Interest

The authors wish to state that there were no conflicts of interest.

Table 1: Socio-demographic characteristics of participants

Characteristics		Frequency	Percentage
Age (years)	<20	3	1.2
	20-29	111	44.0
	30-39	126	50.0
	40-49	12	4.8
Educational level	Primary	21	8.3
	Secondary	84	33.3
	Tertiary	147	58.3
Occupation	Civil servant	57	22.6
	Teaching	42	16.7
	Trading	60	23.8
	Student	42	16.7
	Housewife	21	8.3
	Artisan	30	11.9
Parity	0	114	45.2
	1-2	99	39.3
	3-4	36	14.3
	=5	3	1.2
Gestational age (weeks)	<14	57	22.6
	14-28	150	59.5
	>28	45	17.9

Table 2: Distribution of isolates

Isolates	Frequency	Percentage
Candida albicans	62	54.9
Staphylococcus aureus	30	26.5
Escherichia coli	9	8.0
Klebsiella species	9	8.0
Proteus species	3	2.6

Table 3: The prevalence of asymptomatic genital infection in relation to socio-demographic characteristics of participants

Characteristics		Culture Negative	Culture Positive	Prevalence %	Chi square test	P value
Age (years)	<20	3	0	0.0		
	20-29	63	48	43.2	2.995	0.248
	30-39	66	60	47.6		
	40-49	7	5	41.7		
Educational level	Primary	12	9	42.9		
	Secondary	52	32	38.1	2.597	0.271
	Tertiary	75	72	49.0		
Parity	0	75	39	34.2		
	1-2	42	57	57.6	14.221	*0.001
	3-4	19	17	47.2		
	=5	3	0	0		
Gestational age (weeks)	<14	36	21	36.8		
	14-28	85	65	43.3	5.793	0.055
	>28	18	27	60.0		

*P< 0.05 statistically significant

Table 4: Antimicrobial sensitivity of microbial isolates

Isolate	N	n_1 (% Susceptibility)						
		IMI	LEV	ERY	CEF	GEN	AUG	CHL	COT
Staph aureus	30	9(30.0)	9(30.0)	21(70.0)	9(30.0)	12(40.0)	15(50.0)	6(20.0)	3(10.0)
E. coli	9	0(0.0)	6(66.7)	0(0.0)	6(66.7)	3(33.3)	0(0.0)	0(0.0)	0(0.0)
Klebs. Sp	9	6(66.7)	6(66.7)	0(0.0)	6(66.7)	0(0.0)	3(33.3)	0(0.0)	0(0.0)
Proteus sp	3	3(100)	3(100)	3(100)	0(0.0)	3(100)	3(100)	0(0.0)	3(100.0)
Total	51	18(35.3)	24(47.1)	24(47.1)	21(41.2)	18(35.3)	21(41.2)	6(11.8)	6(11.8)

IMI= IMIPENEM; LEV= LEVOFLOXACIN; ERY= ERYTHROMYCIN; CEF=CEFTAZIDIME;GEN= GENTAMYCIN; AUG= AUGMENTIN; CHL= CHLORAMPHENICOL; COT= CO-TRIMOXAZOLE.

n = number of each bacterial organism isolated

n_1 = number of each bacterial isolate that were sensitive to each antibiotic

REFERENCES

1. KamaraP, Hylton-Kong T, Brathwaite A, Del Rosario GR, Kristensen S, Patrick N *et al*. Vaginal infections in pregnant women in Jamaica: prevalence and risk factors. Int J STD AIDS 2000; 11: 516-20.
2. Dey BC, Koley AK, Saha D, De SK, Saha A. Different types of vaginal infection in pregnancy and its risk factors- A study in urban Medical College Hospital of India. Sch J App Med Sci 2013; 1(6): 962-966.
3. Mobasheri M, Varnamkhast NS, Karimi A, Banaeiyan S. Prevalence study of genital tract infections in pregnant women referred to health centers in Iran. Turk J med Sci 2014; 44: 232-236.
4. Giraldo PC, Araujo ED, Junior JE, Amaral RL, Passos MR, Goncalves AK. The prevalence of urogenital infections in pregnant women experiencing preterm and full term labour. Inf Disease ObstetGynecol, vol. 2012, Article ID 878241, 4pages,2012.doi:10.1155/2012/878241.
5. Usui R, Ohkuchi A, Matsubara S. Vaginal lactobacilli and preterm birth. Journal of Perinatal Medicine 2002; 30(6): 458-466.
6. Novikova N. Antenatal lower genital tract infection screening and treatment programmes for preventing preterm delivery : RHL commentary (last revised: 2 February 2009). *The WHO Reproductive Health Library*; Geneva: World Health Organization.
7. Tellapragada C, Vandana KE, Bhat PV, Rao C, Kamath A, Nayak S *et al*. Lower genital tract infections during pregnancy and adverse pregnancy outcomes: a hospital based observational cohort study. BMC Infectious Diseases 2014; 14(Suppl 3): E35.
8. Akerele J,Abhulimen P, Okonofua F. Prevalence of asymptomatic genital infection among pregnant women in Benin City, Nigeria. Afr J Reprod Health 2002; 6(3): 93-97.
9. Dalzell JE,Lefevre ML. Urinary tract infections during pregnancy. Am Fam Physician 2000; 61(3): 713–721.
10. Gibbs RS. The relationship between infections and adverse pregnancy outcomes: an overview. Ann Periodontol 2001; 6(1): 153–163.
11. Marai W. Lower genital tract infections among pregnant women: a review. East Afr Med J 2001; 78(11): 581-5.
12. Romoren M, Sundby J, Velauthapillai M,

Rahman M, Klouman E, Hjortdahl P. Chlamydia and gonorrhea in pregnant Botswana women: time to discard the syndromic approach? BMC Infect Dis 2007; 7:27.

13. Barry AL, Thornberry C. Susceptibility tests: Diffusion test procedures. In: Ballows A, Hausler WJ, Herrmann KL, Isenberg HD, Shadomy HJ, editors. Manual of Clinical Microbiology. 5th ed. Washington D.C: American Society of Microbiology, 1991; 1117-1125.
14. Mardh PA, Rodrigues AG, Genc M, Novikova N, Martinez-de-Oliviera J, Guaschino S. Facts and myths on recurrent vulvovaginalcandidosis: a review on epidemiology, clinical manifestations, diagnosis, pathogenesis and therapy. Int J STD AIDS 2002; 13(8): 522-539.
15. Reed BD, Zazove P, Pierson CL, Gorenflo DW, Horrocks J. Candida transmission and sexual behaviours as risk for a repeat episode of candidavulvovaginitis. J Women's Health (Larchmt) 2003; 12(10): 979-989.
16. Akadri AA, Adebayo SA. Prevalence and predictors of asymptomatic bacteriuria in HIV positive pregnant women. Online J Med MedSci Res 2014; 3(5): 48-54.
17. Nwadioha SI, Egah DZ, Banwat EB, Alao OO. Microbial agents of abnormal vaginal discharge in pregnant mothers attending PHC centres of Jos, Nigeria. J Clin Med Res 2010; 2: 7-11.
18. Ibrahim SM, BukarM, Galadima GB, Audu BM, Ibrahim HA. Prevalence of bacterial vaginosis in pregnant women in Maiduguri, North-Eastern Nigeria. Niger J ClinPract 2014;17:154-8.
19. Omole-Ohonsi A, Mohammed Z, Ihesiulor U. Vaginal discharge in pregnancy in Kano, Northern Nigeria. Niger Med Pract 2006;50:68-71.
20. Alo MN, Anyim C, Onyebuchi AK, Okonkwo EC. Prevalence of asymptomatic Co-Infection of Candidiasis and Vaginal Trichomoniasis among Pregnant Women in Abakaliki, South-Eastern Nigeria. Journal of Natural Sciences Research2012; 2(7): 87-91.