PREVALENCE, RISK FACTORS AND CLINICAL PRESENTATIONS OF BACTERIAL VAGINOSIS AMONG GROUP OF PREGNANT WOMEN IN LABOR WORD AT MATERNITY TEACHING HOSPITAL IN SULAIMANI CITY

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ABSTRACT

Background

Bacterial vaginosis is a major cause of vaginitis during pregnancy and it results in complications like preterm labor and low birth weight. This may be as a result of excessive growth of anaerobic bacteria in the vagina where it either replaces or reduces normal vaginal flora.

Objectives

To detect prevalence, risk factors and clinical presentation of bacterial vaginosis among pregnant women in Sulaimani Maternity Teaching Hospital

Patients and Methods

A cross sectional, quantitative, non-experimental descriptive design. Sampling technique used was non-probability convenient sampling. The data collection was carried out from 16th December 2016 to 16th April 2017. One hundred women were selected from labor ward and a high vaginal swab was used to obtain discharge from the vagina, then transfer it immediately to Pharma Gen laboratory. Bacterial vaginosis were confirmed by Nugent criteria.

Results

Prevalence of Bacterial vaginosis was 25% and was more in the age group of more than 35 years. Most of them were secondary school graduates and housewives withlow economic status, living in urban and were female with 2-4 gravidity. No relation was found between abortion, and early neonatal death with bacterial vaginosis. Excessive vaginal discharge, pruritis, dysuria, white discharge, and fishy odor are common symptoms. Steroids, antibiotics and diabetes mellitus found to be risk factors.

Conclusion

One quarter of studied women were affected by bacterial vaginosis, common among multigravida and older age. Clinical feature of purities, excessive vaginal discharge, and fishy odor are highly characteristics of this infection. Diabetic women, prolong use of antibiotic or steroid found to be risk factors.

Keywords: *Clinical features, Risk factors, Bacterial Vaginosis, Pregnancy.*

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INTRODUCTION

Vaginal infections are an important women's health problem associated with negative impacts on sexual and family lives and has a tendency of increasing prevalence worldwide. They are currently among the foremost causes that make women seek medical attention at obstetrics and gynecology polyclinics [1]. Pregnancy is the happiest moment for most women in their life, however, many risk factors are harmful to their babies and bacterial vaginosis (BV) is one of them which consider a commonest vaginal infection in women of childbearing age [2] and can affect many pregnant women [3, 4].

Bacterial vaginosis is characterized by low levels of lactobacilli and an increased frequency of facultative anaerobic bacteria. Its prevalence varies, from 20% to 50% among pregnant women [5]. Incidence of BV in asymptomatic pregnant women ranges from 5% in third trimester to 52% in women before 30 week of gestation. The majorities of cases of BV are asymptomatic and remain unreported and untreated [6].

Bacterial vaginosis causes little or no inflammation but a change in the vaginal flora, hence the name vaginosis rather than vaginitis [7]. Normally a healthy vaginal ecosystem composed 95% of lactobacilli in the vagina and produces several antimicrobial compounds, including lactic acid and hydrogen peroxide (H_2O_2) [8]. Women colonized with H_2O_2-producing lactobacilli are less likely to have BV and remain persistently colonized with lactobacilli. Because the presence of Lactobacilli helps to preserve a healthy vagina, as it maintains its acidic environment, which acts as a protective mechanism preventing the proliferation of microbial pathogens and the development of infections [7].

The pathophysiology of BV is an overgrowth of anaerobic microorganisms [9]. This is then accompanied by the production of proteolytic enzymes that act on vaginal peptides to release several biologic products such as polyamines, which is enhanced in an alkaline environment to give out foul-smelling trimethylamine. The polyamines act to facilitate the transudation of vaginal fluid and exfoliation of epithelial cells, creating a copious discharge. *Gardnerella vaginalis* present in high numbers adhere to exfoliated epithelial cells in the presence of a high pH to form what is known as clue cells [7].

Bacterial vaginosis when symptomatic presents as malodorous and increased amount of vaginal discharge, which can be grayish to homogenous white, foul smelling with a fishy odor and itching [6]. BV has repeatedly been associated with adverse pregnancy outcomes, including PTD, late miscarriage, and premature rupture of membranes (PROM), infection of the chorion, amnion and amniotic fluid, and pelvic inflammatory disease [10].

The most common criteria for diagnosis of BV are based on Gram stains and constitute both Nugent score (based on the presence of Gram-positive and Gram-negative rods) and Spiegel score (based on balance between Lactobacilli and Gardnerella). The assessment of clinical signs of (vaginal pH, clue cells, odor, and thin discharge) as defined by Amsel criteria which initially used to diagnose BV. The Spiegel and Nugent diagnostic methods have been preferred in most studies due to their practical applicability [11- 13].

Bacterial vaginosis is generally treated by either systemic or topical Metronidazole or Clindamycin. Bacteriotherapy could also be employed, which involves using non-toxic bacteria to dislodge pathogenic organisms. Clindamycin is a bacteriostatic antibiotic that targets aerobes, Gram-positive and Gram-negative anaerobes, whereas Metronidazole is bactericidal and is usually successful in eliminating Gram-negative anaerobes. Metronidazole does not act against Lactobacillus species; therefore the natural vaginal ecosystem is not markedly disturbed by the administration of this antibiotic [14].

The objective of present study was to find out prevalence, risk factors and clinical presentations of Bacterial Vaginosis among group of pregnant women in Maternity Teaching Hospital in Sulaimani city.

PATIENTS AND METHODS

This study was carried out at Maternity Teaching Hospital in Sulaimani city. It was a cross sectional design: conducted on 100 pregnant women in labor ward in a period of four months (from 16th of December 2016 to 16 April 2017). For the purpose of data collection, a questionnaire was constructed which include the socio-demographic characteristics, information regarding current pregnancy, previous obstetric history, signs and symptoms of bacterial vaginosis, and some associated risk factors.

Criteria for selection of participants was, pregnant ladies > 37 weeks of gestation with intact membrane

and cervical dilatation > 3-4 cm. Data collection was done by direct interview with study participants then high vaginal sterile cotton swabs was obtained from them and placed in a sterile container, which contains 2 drops of normal saline to maintain moisture and immediately transported to the Pharma Gen laboratory for diagnosis of bacterial vaginosis by gram stain using quantitative morphological classification method developed by Nugent et al [11]. The method involved assigning a score between 0 and 10 based on the quantitative assessment of the Gram-stain for four different bacterial morphotypes: Large gram-positive rods (Lactobacillus morphotype), small gram-negative rods (Gardnerella morphotype), small gram variable rods (Bacteroides morphotype), and curved gram variable rods (Mobilincus morphology).

A scoring system based on quantification of different morphotypes on the Gram-stain slide as follow by Nugent's method: score between 0-3 represent normal vaginal flora (No BV), score between 4-6 represent Intermediate vaginal flora, and score between 7-10 were considered diagnosis for BV.

Whiff test was done by adding few drops of 10 % KOH solution in to vaginal swab. A fishy odor due to liberation of amine group is an indicator for *Gradnerella vaginalis*, positive result was recorded.

This study was approved by ethical committee in University of Sulaimani/ Collage of Nursing. Statistical analyses were performed using SPSS version 21 (IBM SPSS Statistical Package for the Social Sciences). Nugent scoring system was used for this purpose of diagnosis. To examine the association between infection with bacterial vaginosis and studied variables, t-test was used to compare means of quantitative variables, and p- values less than 0.05 regarded as statistically significant.

RESULTS

Out of total one hundred pregnant women in labor word, 25% women have bacterial vaginosis. Table 1 summarizes the socio-demographic characteristics of pregnant women with BV and women without BV. The age ranged from 17-40 years old with mean age of women with Bacterial infection was 31.2± 7.9 years was significantly higher than mothers without Bacterial infection was 28.9 ± 5.9 years. The majority of women among the positive group were in age group of more than 35 years compared to non- infection group (44.0% versus 20.%), this was statistically significant (p=value 0.043).

Pregnant women who graduated from secondary school constitute 11 (44%) among infection comparing to non- infection group 24 (32%), while woman who are at college and higher the rate of infection were (8% versus 6.7 %) within infection and non-infection group. Half 13 (52%) of infection group claimed that their income was sufficient, comparing to 32 (42.7%) in non-infection group, on the other hand the women who their economic status are barely insufficient among infection group constitute 12 (48%) and among non-infection group 36 (48%), statistically not significant.

Regarding residence, 52% of infection group were from urban area compared to 48% in non-infection group with no statistical significant differences.

Unplanned pregnancy was significantly higher 16 (64%) among women in Bacterial infection than women without infection 19 (25.3%), (p value <0.001). Regarding ANC visits ten (40%) of bacterial infection among women who have irregular visitis to antenatal care compared to 11 (14.7%) in non-infection group, while women who have regular visiting to ANC have lower rate of infection 9 (36%) compared to non-infection group 56 (74.7%), which is highly significant (Table 2).

Regarding Obstetrical history, statistically there was no association between all variables except for stillbirth. More than half 17 (68%) of infection group are among pregnant women who had 2-4 gravidity compared to non-infection group 37 (94.3%), statistically not significant Table (3).

Regarding parity, half 14 (56%) of bacterial infection were belong to pregnant women who had 1-3 para compared to non-infection group 40 (53.3%), on the other and pregnant woman who were nulliparous constitute 10 (40%) in infection group and 31 (41.3%) in non-infection group, and differences was statistically not significant. Eighteen (72%) of bacterial infection had no history of abortion compared to non-infection group 54 (72%).

In this study, 20 (80%) of infected women have no history of stillbirth compared to 73 (97.3%) in non-infection group with statistically significant difference, on the other hand 24 (96%) of infection group have no history of early neonatal death compared to 70 (93.3%) in non-infection group and statistically was not significant.

Significant association was found between all clinical symptoms and signs of bacterial vagianosis (excessive vaginal discharge, puritis, dyspareunia, dysuria, soreness and burning, white discharge, and fishy odor) among infected pregnant as shown in Table (4). Among women with bacterial vagianosis 10 (40%) have history of diabetes mellitus compare to non-infection group 6 (8%) (p=value < 0.001). Steroid use and prolonged use of antibiotics constitute 18 (72%) among bacterial infection compared to non-infection group 5(6.7%), which was highly significant p value < 0.001 (Table 5).

Table 1. Distribution of sample according to socio-demographic characteristics with bacterial vaginosis

Socio-demographic characteristics		Bacterial vaginosis		P-value
		Yes (25/100)	No (75/100)	
Age	Less than 25 Years	7 (28.0%)	20 (26.7%)	0.043
	25-35 Years	7 (28.0%)	40 (53.3%)	
	More than 35 Years	11 (44.0%)	15 (20.0%)	
	Mean ± SD	31.2 ± 7.9	28.9 ± 5.9	0.13*
Education level	Illiterate	6 (24.0%)	6 (8.0%)	0.08
	Primary school	2 (8.0%)	16 (21.3%)	
	Intermediate school	4 (16.0%)	15 (20.0%)	
	Secondary school	11 (44.0%)	24 (32.0%)	
	Institute	0 (0.0%)	9 (12.0%)	
	Collage and higher	2 (8.0%)	5 (6.7%)	
Economics Status	Sufficient	13 (52.0%)	32 (42.7%)	0.26
	Insufficient	0 (0.0%)	7 (9.3%)	
	Barley sufficient	12 (48.0%)	36 (48.0%)	
Residence	Rural	11 (44.0%)	28 (37.3%)	0.36
	Urban	13 (52.0%)	36 (48.0%)	
	Semi-urban	1 (4.0%)	11 (14.7%)	
Occupation of the women	No employment (housewife)	22 (88.0%)	62 (82.7%)	0.50
	Self-employment	0 (0.0%)	4 (5.3%)	
	Governmental employment	3 (12.0%)	(12.0%)	

*T-test

Table 2. Distribution of sample according to pregnancy characteristics with bacterial vaginosis.

Pregnancy characteristics		Bacterial vaginosis		P-value
		Yes (25/100)	No (75/100)	
Type of current pregnancy	Planned	9 (36.0%)	56 (74.7%)	< 0.001
	Unplanned	16 (64.0%)	19 (25.3%)	
Regularity of ANC visits	Regular visits	9 (36.0%)	56 (74.7%)	0.002
	Irregular visits	10 (40.0%)	11 (14.7%)	
	No visiting	6 (24.0%)	8 (10.7%)	

Table 3. Distribution of sample according to obstetric history with Bacterial vaginosis.

Obstetric history		Bacterial vaginosis		P-value
		Yes (25/100)	No (75/100)	
Gravidity	Primigravida	6 (24.0%)	29 (38.7%)	0.27
	Gravida 2 – 4	17 (68.0%)	37 (49.3%)	
	Gravida 5 or more	2 (8.0%)	9 (12.0%)	
Parity	Para 0	10 (40.0%)	31 (41.3%)	0.95
	Para 1 – 3	14 (56.0%)	40 (53.3%)	
	Para 4 or more	1 (4.0%)	4 (5.3%)	
Abortion	Yes	7 (28.0%)	21 (28.0%)	1.0
	No	18 (72.0%)	54 (72.0%)	
Stillbirth	Yes	5 (20.0%)	2 (2.7%)	0.003
	No	20 (80.0%)	73 (97.3%)	
Early neonatal death	Yes	1 (4.0%)	5 (6.7%)	0.63
	No	24 (96.0%)	70 (93.3%)	

Table 4. Distribution of sample according to vaginal signs and symptoms with Bacterial vaginosis.

Symptoms and of vaginal infection		Bacterial vaginosis		P-value
		Yes (25/100)	No (75/100)	
Excessive vaginal discharge	Yes	25 (100.0%)	22 (29.3%)	< 0.001
	No	0 (0.0%)	53 (70.7%)	
Purities	Yes	21 (61.5%)	11 (14.7%)	< 0.001
	No	4 (38.5%)	64 (85.3%)	
Dyspareunia	Yes	10 (40.0%)	8 (10.7%)	0.001
	No	15 (60.0%)	67 (89.3%)	
Dysuria	Yes	20 (80.0%)	12 (16.0%)	< 0.001
	No	5 (20.0%)	63 (84.0%)	
Soreness and burning	Yes	15 (60.0%)	8 (10.7%)	< 0.001
	No	10 (40.0%)	67 (89.3%)	
White discharge	Yes	7 (28.0%)	5 (6.7%)	0.004
	No	18 (72.0%)	70 (93.3%)	
Fishy odor	Yes	24 (96.0%)	6 (8.0%)	< 0.001
	No	1 (4.0%)	69 (92.0%)	

Table 5. Distribution of sample according to probable risk factors with Bacterial vaginosis.

Probable risk factors		Bacterial vaginosis		P-value
		Yes (25/100)	No (75/100)	
Diabetes mellitus	Yes	10 (40.0%)	6 (8.0%)	< 0.001
	No	15 (60.0%)	69 (92.0%)	
Steroid use	Yes	18 (72.0%)	5 (6.7%)	< 0.001
	No	7 (28.0%)	70 (93.3%)	
Prolong use of antibiotics	Yes	18 (72.0%)	5 (6.7%)	< 0.001
	No	7 (28.0%)	70 (93.3%)	

DISCUSSION

The prevalence rate of BV found in this study (25%) was much lower than 30.9% reported by (Dennis Gyasi 2015) [15]. This rate is too much lower than 64.3% reported by (Ajani et al., 2012) [16] in Nigeria. However, a relatively much lower rate of 6.4% was reported in a large population based study in neighboring Burkina Faso in pregnant women by (Kirakoya et al., 2008) [17]. The varying findings depending on the geographical locations, methods used in sample analysis and the selected group of people used for the studies.

In our research, (44%) of positive group their age are more than 35 years, prospective study done by (Dennis. 2015) [15] in Kintampo reported that (50.55%) of BV were among 21-31 years. Another study done in Ethiopia found the highest percentage (83.5%) of BV is among (30-40) age group (Mengistieet al, 2014) [18].

In this study 11 (44%) of participant were secondary school graduate which was found to be not statistically significant. The findings is similar with a study done by (Ibrahim et al., 2018) [19] shows that (54%) of those with secondary level of education had BV. Lack of education has been found to be significantly associated with bacterial vaginosis (Bahram et al., 2009) [20]. However, our finding like other study (Fang et al., 2007) [21] contradicted this conclusion. In the present study, bacterial vaginosis was higher among illiterate and secondary school compared to primary school graduate.

Nearly half 12 (48%) of the studied infected pregnant women were belong to barely sufficient in their socioeconomic status. The findings of the present study are in agreement with a study done in India by (Babul et al., 2013) [22] found that BV during pregnancy is common among barely sufficient economic status. The result of the study is in agreement to another prospective study by (Indu et al., 2010) [23] found that the incidence of BV was most common in lower socio economic status.

Half of women with BV were from urban 13 (52%) and majority were housewives 22 (88%), these findings are in agreement with a study done in India by (Prosper et al., 2012) [24] stated that BV during pregnancy are more common among housewives women and living in urban area.

The study showed that 10 (40%) of pregnant women with BV did not visit antenatal care regularly which highlighted the importance of regular antenatal visit to get health education during pregnancy which could help in gaining better knowledge regarding hygiene and experience concerning vaginal infections. Women with less visiting to antenatal care during pregnancy are less likely to have such education and experiences making them more prone to vaginal infections (Dennis. 2015) [15]

Regarding obstetrical history, primigravida had less BV and this finding is not in agreement with other studies done by (Dennis, 2015 and Mengistie et al., 2014) [15, 18] which found that BV are more common among multigravida women than primigravida. Among infection group, 14 (56 %) of them were para1-3, this result is similar to a study done in Nigeria by (Ibrahim et al., 2018 and Vitor et al., 2016) [19, 25].

No statistical association was found between early neonatal death and BV but statistically significant association was found between BV and history of stillbirth. A study done by (Briery et al., 2011) [26] found that still birth is a risk factor for occurrence of BV among pregnant women. Nine (28%) of those how have infection have previous history of abortion, while (Kuruga 2012) [27] found that 40.8% of BV are belong to pregnant woman who have previous history of abortion.

In this study, a statistically significant association was found between all signs and symptoms with BV eg., excessive vaginal discharge, Purities, dysparunia ,dysuria, soreness and burning, white discharge, and fishy odor. A study performed in Nigeria by (Ibrahim et al, 2018) [19] showed that clinical features such as vulval itching, dysuria, dyspareunia and lower abdominal tenderness were associated with BV, another study done by (Romeron et al., 2007) [28], reported that these clinical features are not specific in making a diagnosis of BV especially in pregnant woman where physiological discharge and presence of candidiasis increase. Dennis, 2015[15] Reported a significant association between BV and vaginal symptoms (discharge, lower abdominal pains, purities and dysuria). The probability of having BV with any of the vaginal symptoms was almost twice as that of not having the symptom, vaginal discharge and odor individually were significantly associated with BV whiles the remaining symptoms were not associated.

Among those with positive BV 72% had taken antibiotics recently compared with 6.7% among non-infected group, which is highly suggestive of a positive

correlation between recent antibiotics ingestion and development of BV. This result is in agreement with (Olugbenga et al., 2014) [29] which reported that a positive association was found between recent antibiotic intake and BV infection.

Statistical significant association was found between diabetes mellitus and steroid use with BV, same result was found in a study done by (Prasanna et al., 2017) [30]. In another study done by (Mascarenhas et al., 2012) [31] mentioned that other risk factors that we observed with vaginosis were antibiotics/steroid use, and diabetes. The explanation regarding its basis for contributing vaginitis includes that; pregnancy may cause behavioral, environmental, hormonal changes, and reduce the immunity to fight infections, diabetes increases glucose levels in vaginal secretions and body secretions and alters host defence which may increase risk for infection, finally recent antibiotics and steroid use may weaken body immune system and may contribute to infections (Thulkar et al., 2010, Tempera 2005) [32, 33].

Pregnant women are at high risk of vaginal infections especially in the 2nd and 3rd trimesters. Bacterial vaginosis has the potential of causing complications during pregnancy. So pregnant women need screening (testing vaginal secretion) for bacterial vaginosis in ante natal care specially among symptomatic.

In conclusion, one quarter of pregnant women in our study were affected by bacterial vaginosis, common among multigravida and older age. Clinical features of puritis, excessive vaginal discharge, and fishy odor are highly characteristics of this infection. Diabetic women, prolong use of antibiotic or steroid found to be risk factors for the occurrence of infection.

REFRENCES

1. Workowski K, Berman S. Sexually transmitted diseases treatment guidelines. Centers for Disease Control and Prevention. MMWR 2010; 59:1-110.

2. Menard JP, Mazouni C, Fenollar F, Raoult D, Boubli L, Bretelle F. Diagnostic accuracy of quantitativereal-time PCR assay versus clinical and Gram stain identification of bacterial vaginosis. Eur J ClinMicrobiol Infect Dis. 2010; 29: 1547–1552.

3. Trabert B, Misra DP. Risk factors for bacterial vaginosis during pregnancy among African American women. Am J Obstet Gynecol. 2007; 197: 477.e1–477.e8.

4. Cammack AL, Buss C, Entringer S, Hogue CJ, Hobel CJ, Wadhwa PD. The association between early life adversity and bacterial vaginosis during pregnancy. Am J Obstet Gynecol. 2011; 204: 431.e1–8.

5. Myer, L, Denny, L, Telerant, R. Bacterial vaginosis and susceptibility to HIV infection in South African women: a nested case-control study. Infectious Disease 2005; 192:1372–1380.

6. Abahilasha Gupta, Priyanka Garg, Shipra Nigam. Bacterial vaginosis in pregnancy and its effect on pregnancy outcome: a study from a Waster city. Indian Journal of Clinical practice. 2013; 23(11):740-744.

7. Turovskiy, Y., Sutyak Noll, K., Chikindas, M. L. The aetiology of bacterial vaginosis. Journal of applied microbiology 2011; 110(5): 1105-1128.

8. Zhou X, Bent S, Schneider M , Davis C, Islam, R & Forney J. Characterization of vaginal microbial communities in adult healthy women using cultivation-independent methods. Microbiology. 2004; 150: 2565–2573.

9. Livengood, C. H. Bacterial vaginosis: an overview for 2009. Reviews in obstetrics and Gynecology. 2009; 2(1): 28.

10. Marrazzo, J.M. Interpreting the epidemiology and natural history of Bacterial vaginosis: Are we still confused? Anaerobe. 2011;17(4): 186-190

11. Nugent RP, Krohn MA, Hillier SL. Reliability of diagnosing bacterial vaginosis is improved by a standardized method of Gram stain interpretation. J Clin Microbiol 1991; 29: 297–301.

12. Spiegel CA, Amsel R, Holmes KK. Diagnosis of bacterial vaginosis by direct Gram stain of vaginal fluid. J Clin Microbiol. 198;18:170–177.

13. Amsel R, Totten PA, Spiegel CA, Chen KC, Eschenbach D, Holmes K. Diagnostic criteria and microbial and epidemiologic associations. Am J Med 1983;74:14–22.

14. Nelson, D.B and Macones, G. Bacterial vaginosis in pregnancy: Current findings and future directions., Epidemiology Reviews.2002;24: 102-108

15. Gyasi Konadu, Dennis. Prevalence of bacterial vaginosis, trichomoniasis and vulvo vaginal candidiasis in pregnant women attending antenatal clinic at the kintampo municipal hospital. Kintampo. MSc thesis In the Department of Clinical Microbiology, School of Medical Science College of Health Science Kwame Nkrumah University Of Science And Technology, Kumasi. 2015; p46-52

16. Ajani, G., Oduyebo, O., Haruna, M., &Elikwu, C. Nugent Scores of Pregnant Women in a Tertiary Institution in Nigeria. Advances in Microbiology 2012; 2:531-536

17. Kirakoya-Samadoulougou, F., Nagot, N., Defer, M.-C., Yaro, S., Fao, P., Ilboudo, F., et al. Epidemiology of herpes simplex virus type 2 infection in rural and urban Burkina Faso. Sexually transmitted diseases 2011:38(2); 117-123.

18. Zemenu M, Yimtubezinash W, Daniel A, Addis A. Prevalence of bacterial vaginosis among pregnant women attending antenatal care in Tikur Anbessa University Hospital, Addis Ababa, Ethiopia. BMC Research Notes 2014; 7:822

19. Ibrahim SM, Bukar M, Galadima GB, Audu BM, Ibrahim HA. Prevalence of bacterial vaginosis in pregnant women in Maiduguri, North-Eastern Nigeria. .Niger J ClinPract. 2014;17:154-158.

20. Bahram A, Hamid B, Zohre T. Prevalence of bacterial vaginosis and impact of genital hygiene practices in non-pregnant women in Zanjan, Iran. Oman Medical Journal. 2009;24(4): 288–293

21. Fang X, Zhou Y, Yang Y, Diao Y, H. Lie H. Prevalence and risk factors of trichomoniasis, bacterial vaginosis, and candidiasis for married women of child-bearing age in rural Shandong. Japanese Journal of Infectious Diseases. 2007; 60(5): 257–261

22. Babul C , Arnab K K, Dhrubajyati S, Suman K D, Apurba. Different Type of Vaginal Infection in Pregnancy and Its Risk Factor – A Study in Urban Medical College Hospital of India Sch. J. App. Med. Sci, 2013; 1(6):962-966.

23. Indu L, Yashodhara P, Sujata S, Amita J. Estimation of the Incidence of Bacterial Vaginosis and other Vaginal Infections and its Consequences on Maternal/ Fetal Outcome in Pregnant Women Attending an Antenatal Clinic in a Tertiary Care Hospital in North India. Indian Journal of Community Medicine. 2010; 35(2):286-287

24. Prosper A, kihunrwa A, Mirambo M , Massinde A, Rumanyika R, Ngwalida N and et al. Prevalence of bacterial vaginosis and associated factors among pregnant women attending at Bugando Medical Centre, Mwanza, Tanzania. 2012;14(3):175-182.

25. Victor D, Habib M, Abdullahi R, Bamgboye M. Bacterial Vaginosis is a Common Vaginal Infection among First-Time Antenatal Clinic Attendees: Evidence from a Tertiary Health Facility in North-West Nigeria. Journal of Prevention& Infection Control 2016;2 (2):1-9

26. Briery CM, Chauhan SP, Magann EF, Cushman JL, Morrison JC. Treatment of bacterial vaginosis does not reduce preterm birth among high-risk asymptomatic women in fetal fibronectin positive patients. J. Miss. State Med Assoc 2011; 52:72–75.

27. Kuruga Martha. Bacterial vaginosis: prevalence and value of different diagnostic tests among prenatal women at kenyatta national hospital. MSc Thesis of Medicine in Obstetrics and Gynaecology, University of Nairobi in Kenyatta. 2012:1-63

28. Romoren M, Velauthapillai M, Rahman M, Sundby J, Klouman E, Hjortdahl P. Trichomoniasis and bacterial vaginosis in pregnancy: Inadequately managed with the syndromic approach. Bull World Health Organ. 2007;85:297-304.

29. Olugbenga A O, Olufunmilola B M, Rita O, Daniel A. A. Prevalence of vulvo vaginal candidiasis, trichomoniasis and bacterial vaginosis among pregnant women receiving antenatal care in southwestern Nigeria. Eur J Microbiol Immunol. 2014; (4): 193–7.

30. Prasanna D, Sita J, Chham M P, Laxman M. Assessment of Risk Factors and Medication Use for Infectious Vaginitis Among Females of Reproductive Age Visiting Maternity Hospital of Pokhara, Nepal. Public Health Journal. 2017;(10): 140-147

31. Mascarenhas R, Machado M, Costa e S, Pimentel R, Ferreira T, Leoni F, et al. Prevalence and risk factors for bacterial vaginosis and other vulvo vaginitis in a population of sexually active adolescents from Salvador, Bahia, Brazil. Infect Dis Obstet Gynecol. 2012,Article ID378640:1-6.

32. Thulkar J, Kriplani A, Agarwal N, Vishnubhatla S. Aetiology and risk factors of recurrent vaginitis and its association with various contraceptive methods. Indian J Med Res. 2010; 131: 83-7.

33. Tempera G. Vaginal infections: Epidemiology and risk factors. Luglio-Agosto Giorn. It Ost Gin. 2005; 27: 7-8.