BACTERIAL PATTERN AND ANTIBIOTIC RESISTANCE PATTERN IN PREGNANT WOMEN WITH LEUKORHEA IN HAJI ADAM MALIK GENERAL HOSPITAL AND FK USU SATELLITE HOSPITAL IN MEDAN

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Abstract

Objective: To understand the pattern of germs and antibiotic resistance pattern in pregnant women with leukorrhea at Haji Adam Malik Hospital in Medan and the FK USU Satellite Hospital in Medan

Method: This was an observational descriptive study with a case series research design to study antibiotic assessment patterns in pregnant women with bacterial vaginosis which were performed microbiological examinations using vaginal swab specimens. Data were collected using non-probability methods with consecutive sampling techniques. All data is collected and then the proportion distribution is collected.

Results: From the results of the study, the average age of respondents in this study was 28 + 7 years, with a parity of 3.13 + 1.47 and education reaching SMA as many as 28 (60.9%), employment obtained by entrepreneurs as many as 21 (45.7 %)), married status 1.15 + 0.36, with gestational age collected trimsetses 2 as many as 24 (52.2%) and not having sex during pregnancy as many as 36 (79%) respondents collected patients not having previous sexually transmitted infections before hamin 41 (89.2%). Based on this research, we found Ampicillin (AMP), Cefoxitin (FOX), Sulbactam Ampicillin (SAM), Piperacillin Tazobactam (TZP), Cefazolin (KZ), Ceftazidime (CAZ), Ceftriaxone (SAM), Piperacillin Tazobactam (TZP), Cefazolin (KZ), Ceftazidime (CAZ), Ceftriaxone (CRO), Ceftriax (Ceftriax (FRA)) AK), Levofloxacin (LEV), Erythromycin, and Vancomycin (VA) have a high enough resistance rate in aerobic bacteria (resistance> 80%), while Clindamycin (DA) has more. -50%) compared to Metronidazole (MTZ) (resistance between 50-100%) in anaerobic bacteria

Conclusion: most common aerobic bacteria in pregnant women with leukorhea are staphylococcus haemolyticus, Eschercia coli, Aeromonas caviae, and Kocuria kristinae which use anaerobic bacteria found are Gardenella vaginalis, Atropobium vaginale, Actinomyces naeslundi. and Clostridium Clostridioform. Clindamiycin is the drug of choice in infections by anaerobic bacteria.

Keywords: Leukorrhea, vaginal discharge, resistance, antibiotics, pregnancy

INTRODUCTION

The prevalence rate of bacterial vaginosis in pregnant women varies from 6.4% to 38%. The prevalence of BV in Indonesian women has never been launched. Research conducted by Ocviyanti et al., in Karawang District Health Center, Cijantung Battalion Health Center, FKUI and Cipto Mangunkusumo Hospital obtained a BV prevalence in women of 30.7% based on Nugent scores. While research conducted by Joesoef et al. (2001) in 1999 at the Family Planning Clinic in Manado found 32.5% of women with BV.[1] Based on Dina's research conducted at Polyclinic Pregnant Women Hospital of Haji Adam Malik Medan in August-October 2013, there were 23 pregnant women diagnosed with Candida Vulvovaginitis as many as 13 person (56.5%) and Bacterial Vaginosis as many as 5 person (21.7%).[2]

In the literature it is said that the prevalence of BV ranges from 9-23% in public hospitals and in pregnancy ranges from 6.4 to 38%.[3] Gardnerella vaginalis, Prevotella spp., Mycoplasma hominis, Mobiluncus spp. colonize the vagina predominantly in the case of BV.[4] Gardnerella vaginalis, which was first discovered by Leopold in 1953, which has a shape similar to the species of Haemophilus, is a gram-negative bacterium. These bacteria can cause BV.[3] During pregnancy there are some physiological changes that cause disruption of the vaginal ecosystem. During pregnancy there are changes in the inferior genital tract such as hypertrophy of the vaginal wall, increased blood flow and temperature, increased non-specific immunity, and vaginal acidity. Although these changes have a protective function against the uterus, pregnancy, and fetus, these factors predispose to vaginal infections. In addition, the genital mucosa becomes thinner and has a larger surface area making pregnant women more susceptible to infection.[5]

Infection in the reproductive tract such as bacterial vaginosis can pose a serious danger to a pregnant woman and her pregnancy. Infection in the tract predisposes to prematurity, low birth weight, chorioamnionitis, postpartum endometritis, cesarean section wound infection, facilitator of human immunodeficiency virus (HIV) infection because the virus can form port d'entry into cells, and others that can increase perinatal morbidity and mortality.[6] Bacterial Vaginosis is one of the risk factors for preterm birth from babies with low birth weight (LBW). Based on the study of Hiller SH, et al who analyzed 10397 pregnant women and 16% of women who tested positive for BV, related to the incidence of preterm birth from LBW infants by 1.4 times. The results of this study are in agreement with other studies that show an increasement in preterm birth by 2 - 2.8 times in pregnant women with BV.[7] Based on other studies, BV shows that it increases the risk of spontaneous abortion by 2-3 times. In the Isik G study, et al found 12 pregnant women out of 30 (40%) had spontaneous abortion in the past 6 months.[8]

Antibiotics are the main modality for management of reproductive tract infections such as bacterial vaginosis. The use of antibiotics must be rational and appropriate to minimize the risk of resistance. But in reality, there are still many improper use of antibiotics occurring in the community both by factors of medical personnel and patients themselves so that there is an increase in the incidence of antibiotic resistance.[9]

Vaginal swab examination of a pregnant or non-pregnant woman is important if a vaginal discharge is a sign of inflammation or infection in the reproductive tract. Through a vaginal swab examination, it can be seen what pathogenic microorganisms are causing bacterial vaginosis conditions. Sensitivity testing as a follow-up culture examination with vaginal swab specimens will direct antimicrobial therapy to be a definitive rather than empirical therapy so that the therapy becomes more appropriate and more adequate and does not trigger resistance to other antibiotics.[6] Therefore researchers are interested in examining the pattern of antibiotic resistance to bacterial vaginosis in pregnant women using microbiological examinations with vaginal swab specimens at the Haji Adam Malik General Hospital, Medan, Pirngadi Regional General Hospital and Network Hospital.

RESEARCH METHODOLOGY

This research is an observational descriptive study with a case series research design conducted at H Adam Malik General Hospital Medan, Dr. Pirngadi and hospital networks and begin in October 2019 until the large sample is fulfilled.

Subjects were pregnant women with vaginal discharge who went to the Obstetrics Clinic of H Adam Malik General Hospital Medan and network hospitals that met the inclusion criteria, namely pregnant with vaginal discharge, did not suffer from immunosuppressive diseases, did not coitus within 3 days before the research was conducted and the exclusion criteria were swab

samples damaged vagina, agar medium for bacterial growth and damaged sensitivity test, research subjects were unwilling or withdrawn from the study. The number of samples is 46 samples.

Procedure

Sampling begins by preparing swab amies and the transport medium has been given the patient's identity. Two vaginal swabs were used for aerobic culture and anaerobic culture, the samples were stored in coolerbox at $4^{o}C$ then the samples were taken to the Microbiology Laboratory of USU Hospital to be examined.

Aerobic cultivation began with swab samples on sheep blood 5% agar coloumbia media and mac-conkey agar media with 4 quadrant sticks. Then incubated for 24 hours with $37^{o}C$ temperature. Anaerobic cultivation begins by swabbing swab samples on sheep blood 5% agar brucella media with a 4-quadrant stick. Then put into anaerobic jar with the addition of anaerogen kit and indicator for incubation of the sample anaerobically, then incubated for 48 hours at $47^{o}C$.

Macroscopic observations were made by observing the presence or absence of growth of bacterial colonies on the surface of the media both on aerobic and anaerobic cultivation media. If there is growth of bacterial colonies, it is continued with microscopic observation, whereas if there is no growth of bacterial colonies, it can be concluded as no bacterial growth (TAPB).

Microscopic observation begins with fixation using a glass object, by choosing a colony that grows dominantly, then the fixation is fixed for gram staining. Gram staining is done by dripping the first solution of crystal violet in the preparation for 5 minutes, rinsing with water, dripping lugol solution and left for up to 2 minutes, then rinsing with water and diluting with aceton alcohol, then dripping the second solution of water fuchsin for 1 minute, then rinsing with water for 2 minutes until clean and dried at room temperature. Observations were made under a microscope to distinguish bacteria based on morphological structure to determine the type of vitek card used for identification.

Bacterial identification begins with preparing the bacterial suspension, 1-2 bacterial colonies are inserted into the inoculum tube containing 0.45% sodium chloride fluid, suspense turbidity is sealed with 0.5 Mc-Farland using an automatic nephlophotometer (densi check). The inoculum tube is placed into the vitek tape sequentially to insert the vitek card according to the group of bacteria that have been observed microscopically, for example the GN card for

identification of paired gram negative bacteria with an AST card GN93 for antibiotic sensitivity testing, the GP card for identification of gram positive bacteria paired with GP67 AST card for antibiotic sensitivity testing. Then all samples are put into the machine and the results will automatically be read by the Vitek 2 Compact machine for 8-24 hours. While the ANC card for the identification of anaerobic bacteria with conventional resistance tests using E-Test (Metronidazole and Clindamycin) which was incubated for 48-72 hours.

Interpretation results obtained in the form of types of bacteria and antibiotic sensitivity tests (resistant / sensitive) to be analyzed in the form of germ patterns and antibiotic sensitivity patterns. Then the data is tabulated and then analyzed for frequency distribution data

RESULTS

The characteristics of the study sample were based on the age of the study subjects with an average of 28 ± 7 SD. Based on the parity category, the average score is 3.13 ± 1.47 SD. Based on the education category the research subjects were divided into 43 groups, namely 9 elementary schools (19.6%), 5 junior high school students (10.9%), 28 senior high school students (60.9%) and college 4 person (8.7%). Based on the occupational categories of research subjects were divided into 3 groups, namely housewife with 14 person (30.4%), self-employed 21 person (45.7%) and civil servants 11 person (23.9%). Based on marital status, it was obtained with a mean of 1.15 ± 0.36 SD. Based on the trimester of pregnancy the research subjects were divided into 3 groups, namely trimester 1 with 7 person (15.2%), trimester 2 with 24 person

(52.2%) and trimester 3 with 15 person (32.6%). Based on coitus in pregnancy history, 10 person (21%) were found have done coitus and without coitus history as many as 36 person (79%). Meanwhile, a history of sexually transmitted infections before pregnancy was found in 5 samples (10.8%) and the rest 41 sampels had never experienced a sexually transmitted infection before pregnancy (89.2%).

Table 1. Characteristics of Research Samples

Characteristics	
Age (Mean ± sd)	28±7
Parity (Mean ± sd)	3.13 ± 1.47
Education n (%)	
Elementary	9(19,6)
Junior High School	5 (10,9)
Senior High School	28(60,9)
College	4(8,7)
Occupational n (%)	
Housewife	14(30,4)
Self-employed	21(45,7)
Civil Servant	11(23,9)
Marital Status (Mean ± SD)	1.15±0.36
Trimester of Pregnancy n(%)	
Trimester 1	7(15,2)
Trimester 2	24(52,2)
Trimester 3	15(32,6)
Coitus in Pregnancy History	
Yes	10(21)
No	36(79)
History of sexually transmitted infections before pregnancy	
Yes	5(10,8)
No	41(89,2)

Comparison of aerobic microorganisms and vaginal anaerobic swabs in research subjects. In the vaginal swab with aerobic microorganisms found Acitenobacter baumannii 1 person (2.2%), Aeromonas caviae 5 person (10.9%), Aeromonas veronii 3 person (6.5%), Burkholderia cepacia 2 person (4% , 3%), Enterobacter cloacae 1 person (2.2%), Enterococcus faecalis 1 person (2.2%), Enterobacter faecium 1 person (2.2%), Escherecia coli 6 person (13%) , Klebsiella pneumonia 4 person (8.7%), Kocurian kristinae 5 person (10.9%), Spingomonas paucimobilia 3 person (6.5%), Staphylococcus aureus 1 person (2.2%), Staphylococcus haemolyticus 6 person (13%), Staphylococcus lugdunensis 1 person (2.2%), TAPB 6 person (13%), whereas in vaginal swabs with anaerobic microorganisms found Actinomyces naeslundii 2 person (4.35%), Atopobium vaginae as many as 7 person (15.22%), Bifidobacterium spp. 2 person (4.35%), 1 person Clostridium baratii (2.17%), 1 person Clostridium bifermentans (2.17%), 1 person Clostridium limosum (2.17%), 2 person Clostridium clostridioform (4.35%), and Gardnerella vaginalis as many as 25 person (54.35%) and TAPB as many as 4 person (8.7%).

Table 2. Comparison of Aerobic and Anaerobic Microorganisms in Vaginal Swabs

Aerob	n	%	Anaerob	N	%
Acinetobacter baumannii	1	2.2%	Actinomyces naeslundii	2	4.35%
Aeromonas caviae	5	10.9%	Atopobium vaginae	7	15.22%
Aeromonas veronii	3	6.5%	Bifidobacterium spp.	2	4.35%
Burkholderia cepacia	2	4.3%	Clostridium baratii	2	4.35%
Enterobacter cloacae	1	2.2%	Clostridium bifermentans	1	2.17%
Enterococcus faecalis	1	2.2%	Clostridium limosum	1	2.17%
Enterococcus faecium	1	2.2%	Clostridium clostridioform	2	4.35%
Escherichia coli	6	13.0%	*Gardnerella vaginalis*	25	54.35%
Klebsiella pneumonia	4	8.7%	TAPB	4	8.70%
Kocuria kristinae	5	10.9%			

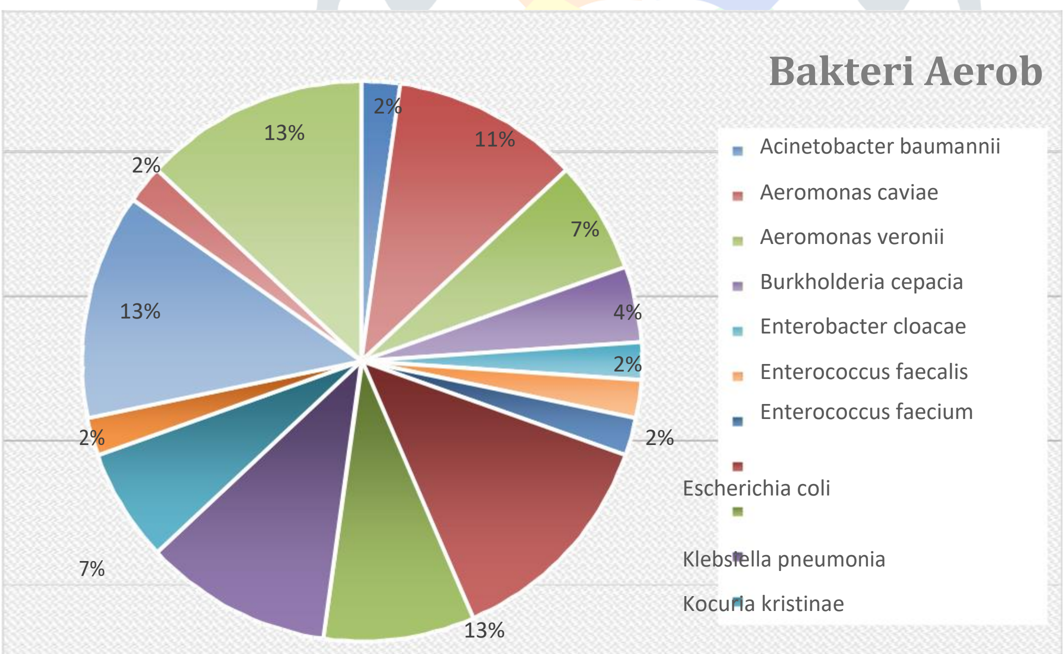

Figure 1. Diversity of Aerob Swab Vaginal Isolates

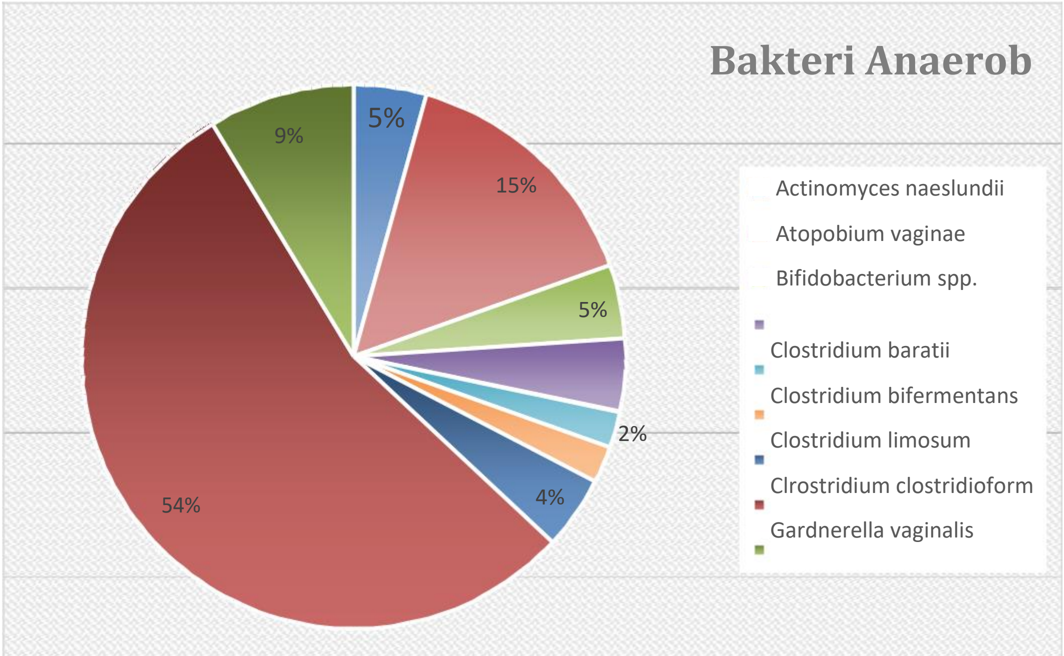

Figure 2. Diversity of Vaginal Swab Anaerobic Isolates

Table 3. Germ resistance pattern

Isolat (n)	Germ resistance pattern (%)																								
	AMP	FOX	SAM	TZP	OXA	KZ	CAZ	CRO	FEP	ATM	AK	GN	CIP	LEV	MOX	E	DA	LZ	VA	TE	TGY	EPM	MEM	SXT	MTZ
Acinetobacter baumannii (1)	-	-	0 (0)	0 (0)	-	100 (1)	0 (0)	100 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	-	-	-	-	-	-	-	0 (0)	0 (0)	0 (0)	0 (0)	-
Aeromonas caviae (5)	-	-	100 (5)	100 (5)	-	100 (1)	100 (5)	100 (5)	100 (5)	100 (5)	0 (0)	0 (0)	100 (5)	-	-	-	-	-	-	-	0 (0)	40 (2)	60 (3)	80 (4)	-
Aeromonas veronii (3)	-	-	66.6 (2)	0	-	100 (3)	66.6 (2)	66.6 (2)	66.6 (2)	66.6 (2)	0 (0)	33.3 (1)	66.6 (2)	-	-	-	-	-	-	-	0 (0)	0 (0)	0 (0)	100 (3)	-
Burkholderia cepacia (2)	-	-	100 (2)	100 (2)	-	100 (2)	50 (1)	50 (1)	50 (1)	100 (2)	100 (2)	50 (1)	100 (2)	100 (2)	-	-	-	-	-	-	100 (2)	50 (1)	50 (1)	100 (2)	-
Enterobacter cloacae (1)	100 (1)	-	100 (1)	100 (1)	-	100 (1)	100 (1)	100 (1)	100 (1)	100 (1)	-	100 (1)	100 (1)	-	-	-	-	-	-	-	0 (0)	100 (1)	100 (1)	100 (1)	-
Enterococcus faecalis (1)	100 (1)	-	-	-	100 (1)	-	-	-	-	-	-	-	100 (1)	100 (1)	100 (1)	100 (1)	100 (1)	-	-	-	-	-	-	-	-
Enterococcus faecium (1)	100 (1)	-	-	-	100 (1)	-	-	-	-	-	-	100 (1)	100 (1)	100 (1)	100 (1)	100 (1)	100 (1)	0 (0)	100 (1)	100 (1)	100 (1)	-	-	100 (1)	-
Escherichia coli (6)	100 (6)	-	83.3 (5)	50 (3)	-	100 (6)	100 (6)	100 (6)	83.3 (5)	83.3 (5)	0 (0)	33.3 (2)	50 (3)	-	-	-	-	-	-	-	0 (0)	33.3 (2)	33.3 (2)	83.3 (5)	-
Klebsiella pneumoniae (4)	100 (4)	-	100 (4)	75 (3)	-	100 (4)	75 (3)	75 (3)	75 (3)	75 (3)	25 (1)	25 (2)	75 (3)	-	-	-	-	-	-	-	50 (2)	75 (3)	75 (3)	75 (3)	-
Kocuria kristinae (5)	40 (2)	-	-	-	40 (2)	-	-	-	-	-	-	0 (0)	80 (4)	60 (3)	60 (3)	40 (2)	60 (3)	20 (1)	0 (1)	80 (4)	40 (2)	-	-	40 (2)	-
Spingomonas paucimobilis (3)	100 (3)	-	100 (3)	33.3 (1)	-	100 (3)	66.6 (2)	100 (3)	33.3 (1)	100 (3)	100 (3)	66.6 (2)	66.6 (2)	-	-	-	-	-	-	-	33.3 (1)	33.3 (1)	33.3 (1)	66.6 (2)	-
Staphylococcus aureus (1)	100 (1)	100 (1)	100 (1)	-	100 (1)	100 (1)	100 (1)	100 (1)	100 (1)	100 (1)	-	0 (0)	100 (1)	100 (1)	100 (1)	100 (1)	0 (0)	100 (1)	100 (1)	0 (0)	100 (1)	100 (1)	100 (1)	100 (1)	-
Staphylococcus haemolyticus (6)	100 (6)	83.3 (5)	80 (5)	-	83.3 (5)	80 (5)	80 (5)	80 (5)	80 (5)	-	-	50 (3)	83.3 (5)	100 (6)	83.3 (5)	100 (1)	83.3 (5)	83.3 (5)	50 (3)	66.6 (4)	50 (3)	100 (1)	100 (1)	83.3 (5)	-
Staphylococcus lugdunensis (1)	100 (1)	100 (1)	100 (1)	-	100 (1)	100 (1)	100 (1)	100 (1)	100	-	-	0 (0)	0 (0)	0 (0)	0 (0)	100 (1)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	-	-	100 (1)	-
Actinomyces naeslundii (2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50 (1)	-	-	-	-	-	-	-	100 (2)
Atopobium vaginae (7)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28.5 (2)	-	-	-	-	-	-	-	71.4 (5)
Bifidobacterium spp. (2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50 (1)	-	-	-	-	-	-	-	100 (2)
Clostridium baratii (2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50 (1)	-	-	-	-	-	-	-	100 (2)
Clostridium bifermentans (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 (0)	-	-	-	-	-	-	-	50 (1)
Clostridium limosum (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 (0)	-	-	-	-	-	-	-	50 (1)
Clrostridium clostridioform (2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50 (1)	-	-	-	-	-	-	-	100 (2)
Gardenella Vaginalis (25)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20 (5)	-	-	-	-	-	-	-	80 (20)

The patterns of germ resistance are Acitenobacter baumannii resistant to KZ and CRO (100%), Aeromonas caviae resistant to SAM, TZP, KZ, CAZ, CRO, FEP, APM, CIP (100%) and to SMT (80%), MEM (60%) %), EPM (40%). Aeromonas veronii is resistant to KZ and SXT (100%), SAM, CAZ, CRO, FEP, ATM, CIP, (66.6%) and GN (33.3%). Burkholderia cepacia is resistant to SAM, TZP, KZ, ATM, AK, TIP, LEV, TGY, SXT (100%) and CAZ, CRO, FEP, GN, EPM, MEM (50%). Enterobacter cloacae are resistant to AMP, SAM, TZP, KZ, CAZ, CRO, FEP, ATM, GN, CIP, APM, MEM, SXT (100%). Enterococcus faecalis is resistant to AMP, OXA, CIP, LEV, MOX, E, DA (100%), Enterobacter faecium is resistant to AMP, OXA, GN, CIP, LEV, MOX, E, DA, VA, TE, TGV, SXT 100%

Escherecia coli is resistant to AMP, KZ, CAZ, CRO, (100%) while SAM, FEP, ATM, SXT (83.3%), TZP, CIP (50%), and GN, EPM, MEM (33.3%). Klebsiella pneumonia is resistant to AMP, SAM, KZ (100%), TZP, CAZ, CRO, FEP, ATM, CIP, EPM, MEM, SXT (75%), TGV (50%), AK, GN (25%). Accomplishment of crystalline resistors against CIP, TE (80%), LEV, MOX, DA (60%), AMP, OXA, E, TGV, SXT (40%), and LZ (20%). Spingomonas paucimobilia is resistant to AMP, SAM, KZ, CRO, ATM, AK (100%), CAZ, GN, CIP, SXT (66.6%), TZP, FEP, TGV, EPM, MEM (33.3%). Staphylococcus aureus is resistant to AMP, FOX, SAM, OXA, KZ, CAZ, CRO, FEP, ATM, CIP, LEV, MOX, E, LZ, VA, TGV, EPM, MEM, SXT (100%).

Staphylococcus haemolyticus is resistant to AMP, LEV, E, EPM, MEM (100%), FOX, OXA, CIP, MOX, DA, LZ, SXT (83.3%), SAM, KZ, CAZ, CRO, FEP (80%)), TE (66.6%), GN, VA, TGV (50%). Staphylococcus lugdunensis is resistant to OXA, AMP, FOX, SAM, KZ, CAZ, CRO, FEP, E, SXT (100%). Actinomyces naeslundii is resistant to DA (50%) and MTZ (100%), Atropobium vaginale is resistant to DA (28.5%) and MTZ (71.4%), Bifidobacterium spp. resistant to DA (50%) and MTZ (100%), Clostridium baratii resistant to DA (50%) and MTZ (100%), Clostridium bifermentans resistant to DA (0%) and MTZ (50%), Clostridium limosum is resistant to DA (0%) and MTZ (50%), Clostridium clostridioform are resistant to DA (50%) and MTZ (100%), Gardnerella vaginalis is resistant to DA (20%) and MTZ (80%).

DISCUSSIONS

The aim of this study was to find out the pattern of antibiotic resistance in pregnant women suffering from bacterial vaginosis which was performed microbiological examinations using vaginal swab specimens with a large sample in this study as many as 46 samples. In the vaginal swab with aerobic microorganisms found Acitenobacter baumannii 1 person (2.2%), Aeromonas caviae 5 person (10.9%), Aeromonas veronii 3 person (6.5%), Burkholderia cepacia 2 person (4% , 3%), Enterobacter cloacae 1 person (2.2%), Enterococcus faecalis 1 person

(2.2%), Enterobacter faecium 1 person (2.2%), Escherecia coli 6 person (13%) , Klebsiella pneumonia 4 person (8.7%), Kocurian kristinae 5 person (10.9%), Spingomonas paucimobilia 3 person (6.5%), Staphylococcus aureus 1 person (2.2%), Staphylococcus haemolyticus 6 person (13%), Staphylococcus lugdunensis 1 person (2.2%), TAPB 6 person (13%), whereas in vaginal swabs with anaerobic microorganisms found Actinomyces naeslundii 2 person (4.35%), Atopobium vaginae as many as 7 person (15.22%), Bifidobacterium spp. 2 person (4.35%), 1 person Clostridium baratii (2.17%), 1 person Clostridium bifermentans (2.17%), 1 person Clostridium limosum (2.17%), 2 person Clostridium clostridioform person (4.35%), and Gardnerella vaginalis as many as 25 person (54.35%) and TAPB as many as 4 person (8.7%).

Abdelaziz et al, in the study stated that of 200 registered pregnant women, BV was detected in 49.8%, followed by Chlamydia trachomatis (31.3%) and Candida albicans (16.6%), with low frequency Neisseria gonorrhoeae (1,8%) and Trichomonas vaginalis (0.5%). Higher infection rates were recorded among subjects in the third trimester (71.6%) than in the second trimester of pregnancy (28.4%). The study concluded that pregnant women with vaginal complaints revealed various positive microbiological results. Such cases may require specific drugs. Routine culture of vaginal and cervical samples should be performed on all pregnant women during prenatal visits.[10]

Choi et al. stated that the overall detection rate for each microorganism was: U. urealyticum, 62.7%; M. hominis, 12.7%; GBS, 7.9%; C. trachomatis, 2.4%; and HSV type II, 0.8%. The rate of GBS colonization in the control group was 17.6%. The prevalence of GBS, M. hominis, and U. urealyticum in preterm labor and spontaneous preterm birth is 3.8% and 8.7% (relative risk [RR], 2.26), 3.8% and 17.3% (RR, 4.52), and 53.8% and 60.9% (RR, 1.13), respectively, did not show significant differences between the 2 groups. Detection of M. hominis level by PCR was higher than that by the culture method (11.1% vs 4.0%, P = 0.010).Detection rates of U. urealyticum by PCR and culture methods were 16.7% and 57.1%.[11]

Masri et al. Stated that out of 1163 specimens, 200 (17.2%) candida spp were confirmed from vagina of a pregnant woman. Candida albicans (83.5%) was the most commonly detected species followed by Candida glabrata (16%) and Candida famata (0.05%). All C. albicans and C.famata isolates were susceptible to fluconazole, whereas C. glabrata isolates had dose-dependent susceptibility.[12]

Microbial infection of the vagina in pregnant women is a serious problem because it can cause complications such as preterm labor, amniotic fluid infections, premature rupture of membranes, low birth weight, and cause high prenatal mortality, but proper identification and treatment will reduce the risk of preterm birth. The vagina can be infected by various pathogens including bacteria, fungi, viruses, and parasites.[11,13] BV is the most frequent vaginal infection, characterized by the replacement of Lactobacillus species which are the normal flora of the vagina by overgrowth of microorganisms including Gardnerella vaginalis, Bacteroides species, genital mycoplasma, and other anaerobic bacteria..[14]

Some vaginal infections are common among women of reproductive age, with a high incidence during pregnancy. Pregnant women experience a two-fold increase in the prevalence of colonization of vaginal microorganisms compared to non-pregnant women. Increased levels of circulating estrogen and deposition of glycogen and other substrates in the vagina during pregnancy affect this association.[11]

BV increases the risk of sexually transmitted infections, including HIV. Failing to detect it can have serious effects on a woman's health. According to a meta-analysis conducted by Leitich et al., Pregnant women with BV have a risk that is more than double that of premature births compared to women without BV (odds ratio: 2.16; 95% CI: 1.56-3.00). This risk proved even greater among women where BV was diagnosed early in pregnancy. Among women undergoing preterm labor, BV doubles the risk of labor before 37 weeks of gestation (odds ratio: 2.38; 95% CI: 1.02-5.58). In addition, BV increases the risk of miscarriage and postpartum maternal infection.[2]

Bitew et al, in the study stated that of 151 isolates, as many as 105 (69.5%) were Gram-negative bacteria and 46 (30.5%) were Gram-positive bacteria. From Gram-negative bacteria, E. coli and Klebsiella spp. dominant. S. aureus and S. agalactiae are the dominant Gram-positive bacteria.[15]

Bitew et al. Stated that summarizing the overall pattern of susceptibility of Gram-positive bacterial drugs to eleven antibacterial drugs tested. Among the agents tested, the highest overall resistance in Gram-positive bacteria was observed in penicillin (67.4%), followed by tetracycline (58.7%) and erythromycin (45.6%). Cefoxitin and tobramycin are the most active drugs tested against Gram-positive bacteria. S. aureus, the most commonly isolated Gram-positive bacteria, is 97.2%, 88.8%, and 86.1% sensitive to cefoxitin, tobramycin, and clindamycin. The overall pattern of drug susceptibility of Gram-negative bacteria to the nine agents tested was summarized in the level of drug resistance (77.3%) against Gram-negative bacteria, followed by ampicillin (77.1%) and amoxicillin (70.6%). Amikacin with an overall sensitivity level of 85.7% and tobramycin with an overall sensitivity level of 82.8% are better active against Gram-negative bacteria.[15]

As far as the specific antimicrobial resistance level of the species concerned, E. coli, the bacteria most frequently isolated, shows 76.7% resistance to ampicillin and tetracycline. The lowest levels of resistance were observed with amikacin and tobramycin. Amikacin, tobramycin, and gentamicin are the most active drugs against K. pneumoniae, the second most common isolated Gram-negative bacteria.[15]

Mulu et al. Stated that E.coli, Pseudomonas spp. and S. aureus are often isolated. Norfloxacin (75.6%), ciprofloxacin (79.6%) and gentamicin (77.6%) showed high levels of sensitivity while high levels of resistance were observed for amoxicillin (82.2%), tetracycline (63.3%) and cotrimoxazole (62.2%).[16]

Similarly, the overall drug resistance level of Gram-positive bacterial isolates ranged from 2.8% for cefoxitin to 67.4% for penicillin. S. aureus, the most commonly isolated gram-positive bacterium, expresses a high level of resistance to the commonly prescribed drugs, penicillin, tetracycline, and erythromycin. These results are consistent with research conducted in Ethiopia and Pakistan by Bitew et al. The availability of antimicrobials without a prescription and schedule for giving the wrong dose can explain the high level of drug resistance in this study.[15]

Abdulaziz et al., This study showed that 64% of Vibrio mobiluncus isolates were sensitive to metronidazole, whereas Gardnerella vaginalis and N. gonorrhoeae were resistant to metronidazole. One limitation of this study is the gap in vitroantimicrobial testing for several isolated organisms, but a large number of antimicrobial agents were tested against the Mycoplasma species. An antimicrobial sensitivity test from isolated bacteria showed that clarythromycin was active against both M. hominis and U. urealyticum. Gentamicin is the most active against Gram-positive and Gram-negative bacteria. Vancomycin is active against Gram-positive bacteria. Ciprofloxacin is an active drug against Gram-negative, and imipenem is most active against anaerobic microorganisms.[10] Shopova et al. reported Gardnerella vaginalis as the main microorganism associated with recurrent BV; sensitive in 34% of cases with metronidazole treatment and in 82% of cases with treatment using clindamycin.[17] This is in line with studies by Teixeira et al and Nagaraja, where treatment with Clindamycin has a sensitivity of 100% and 76%.[18,19]

Regarding the metronidazole resistance profile, a high level of resistance has been observed. Austin et al. get 68% resistance, with a minimum inhibition concentration (KHI) 50% of 32.0 μg mL-1, 90% KHI> 256.0 μg mL-1, and variations of 2.0 -> 256.0 μg mL-1 (highest concentration tested).[20] Teixeira et al. found a 70% resistance to metronidazole, and a 90% KHI> 512 μg mL.[19] Goldestein et al. has shown a 20% resistance to Gardnerella vaginalis against metronidazole, and the same group reported 29% resistance to metronidazole in 2002.[21] Austin et al. resistance was related to the Gardnerella vaginalis isolate, with 54% resistant to tinidazole and 68% resistant to metronidazole (470 isolates).[20] Nagaraja et al found 34 (68%) strains resistant to metronidazole, which is a very high level in the population under study. Our results corroborate the literature and show antimicrobial resistance to drugs used empirically in chemotherapy.[19,22]

Ampicillin is not used routinely for the treatment of BV because it is not effective in eradicating Gardnerella vaginalis. This may be due to the activation of ampicillin by beta-lactamase produced by other vaginal anaerobes and not specifically by Gardnerella vaginalis. High levels of ampicillin resistance and moderate resistance are often found. With regard to ampicillin / sulbactam treatment (beta-lactamase inhibitors), samples of resistant bacteria were not observed, (although a small proportion were classified as intermediate resistance). These results are similar to those found by Goldstein et al, who observed 100% sensitivity to this antimicrobial. Our findings suggest that the resistance phenomenon observed among strains of Gardnerella vaginalis may be related primarily to the production of beta-lactamase.[22]

Backer et al. Showed that metronidazole resistance of Atopobium vagina is not an intrinsic feature. Metronidazole resistance of up to 29% has been described for Gardnerella vaginalis but the mechanism of resistance cannot yet be clarified. Perhaps this could be due to the lack of nitroreductase needed to produce hydroxy metronidazole metabolites, which have strong antibiotic activity from parent compounds.[23]

Actinomycetes are gram-positive bacteria with high G + C content and are the most widely distributed group of microorganisms in nature that mainly inhabit soil. Based on research conducted by Smith on Actinomyces species, Metronidazole cannot be used to treat these infections without adding other antimicrobial agents, because metronidazole is not active in treating actinomycetes. Actinomyces can be treated by giving beta lactamase agents and beta lactamase inhibitors. In addition, treatment with Ciprofloxacin and tetracycline is also not effective for Actinomycetes.[24]

Clostridium difficile is known to be resistant to several antibiotics, such as aminoglycosides, lincomycin, tetracycline, erythromycin, Clindamycin, penicillin, cephalosporins, and fluoroquinolones, which are commonly used in the treatment of bacterial infections. Recent statistics based on 30 antimicrobial susceptibility studies of clostridium isolates published between 2012 and 2015 reveal that resistance to clindamycin (8.3% to 100%), cephalosporins (51%), erythromycin (13% to 100%), and fluoroquinolones (47 %) based on CLSI. Among cephalosporins and fluoroquinolones, resistance to second generation cephalosporins (cefotetan and cefoxitin) and fluoroquinolones (ciprofloxacin) is very common (79% and 99% of the strains tested); while a certain percentage of C. difficile showed resistance to third-generation cephalosporins (ceftriaxone and cefotaxime; 38% of the strains tested) and broad-spectrum fluoroquinolones (moxifloxacin and gatifloxacin; 34% of the strains tested).[25]

Various studies on antimicrobial resistance from C. difficile isolates from North America, Europe, and Asia in the past 15 years show moxifloxacin resistance rates from C. difficile isolates vary from 2% to 87%, and the clindamycin resistance level reaches between 15% to 97% . Nearly 30% of ribotype 27 strains are resistant to several drugs, including Clindamycin, moxifloxacin, and rifampicin in North America, using CLSI breakpoints for verification testing of anaerobic bacteria. In a retrospective study of patterns of antibiotic resistance in Indonesia, about 98% of the ribotype 27 strains were resistant to moxifloxacin; C. difficile ribotype strain 078 (another hypervirulent genotype) isolated from humans and piglets in the Netherlands with active CDI showing resistance to ciprofloxacin, erythromycin, imipenem, and moxifloxacin according to CLSI Breakpoints.[25]

Kaur et al in his study found that Gardenella Vaginalis was resistant to amoxicillin, erythromycin, miconazole, and tinidazole. While the patterns of resistance to cefixime, ciprofloxacin, cotrimoxazole, ofloxacin, penicillin, rifampicin and tetracycline could not be identified in this study. Ara et al found that gardenella vaginalis was resistant to tetarcycline (31%), cotrimoxazole (30%), ciprofloxacin (26%), metronidazole (52.63%), erytromicin (10%), chloramphenicol (4%), ampicillin (1%) and ceftriaxon (1%) and no resistance was found in clindamicin and vancomycin (fig, 2017). Based on the research of Bhooshan et al, they found that gardenella vaginalis was sensitive to imipenem and meropenen, amikacin, and gentamicin, with resistance found mainly in ampicillin and nalidixic acid.[26,27,28]

Steininger et al. In their research on Actinomyces naeslundi found that this species was sensitive to ampicillin / sulbactam (100%), clindamicin (81%), tetracycline (100%), carbapenems (100%), metronidazole (4%), penicillin G (100%) %), tegecycline (1005) and vacomycin (100%). So we can see that 96% of the strain actiomyces naeslundi are resistant to metronidazole, so that metronidazole is not recommended for this infection.[29]

Based on Bakri et al, in their study they found that clostridium was resistant to ampicillin (72%), ciprofloxacin (27%), clindamicin (33.3%), erytromicin (50%), gentamicin (83.3%), nalidixic acid (27%) 77.78%), tetacycline (27.78%), piperacuycline-tazobactam (33.33%) and cefoxitin (22.2%) and sensitive to chloramphenicol (88.89%) and metronidazole (94.44%). In the study of Silva et al, they found clostridium was resistant to erytromicin (22.2%), oxytetracycline (27.8%), lincomycin (72.2%) and sensitive to penicillin (100%), metronidazole (100%), vancomycin (100%).[30] Based on this study, it was found that a history of sexually transmitted infections before pregnancy was found in 5 (10.8%) and the rest had never experienced a sexually transmitted infection before pregnancy 41 (89.2). Based on research conducted by Trabert, all subjects were African-American, who were relatively young (mean age, 22.8; sd, 5.25), and low socioeconomic status. About half of respondents reported a history of reproductive tract infections; 43% reported a history of sexually transmitted infections. Nearly 16% reported having sex at least once a week during the first trimester of pregnancy at this time; 28% reported having sexual intercourse more often during the same time period. Among all women examined antenatally (n = 485), from examination of vaginal specimens, 25% of samples (110/438) were positive for BV.[31]

Teja et al in his study found an association between bacterial vaginosis and cervicitis, endometriosis, and salpingitis. Sexual intercourse during pregnancy should be considered in pregnant women with a history of recurrent bacterial vaginosis infection, whereas in women who have no history of bacterial vaginosis infection or a history of other genital infections, sexual intercourse during pregnancy is still permissible and has not been proven to increase the incidence of preterm labor.[22]

Based on research by Thorsen et al, significant risk factors for bacterial vaginosis are: history of coitus (adjusted RR 2.09 [1.43-3.04]), history of previous genital infection with Chlamydia trachomatis or Neisseria gonorrhoeae (1.39 [1.07-1.79]).[32] Joyisa et al reported in their study that there was no relationship between the incidence of bacterial vaginosis with the duration of sexual intercourse, frequency of unprotected sex during pregnancy, number of sexual partners or age of sexual partners.[33]

CONCLUSION

Based on this study found patterns of microorganisms in bacterial vaginosis with the majority of aerobic bacteria found were staphylococcus haemolyticus 6 (13%), Eschercia coli 6 (13%), Aeromonas caviae 5 (10%), and Kocuria kristinae while the majority of anaerobic bacteria found were Eschercia coli 6 (13%), Aeromonas caviae 5 (10%), and Kocuria kristinae while the majority of anaerobic bacteria encountered were Gardenella vaginalis 25 (54.35%), Atropobium vaginae 7 (15.22%), Actinomyces naeslundii 2 (4.35%), Bifidobacterium Spp. 2 (4.35%) and Clostridium Clostridioform 2 (4.35%). Based on this study, Ampicillin (AMP), Cefoxitin (FOX), Ampicillin Sulbactam (SAM), Piperacillin Tazobactam (TZP), Cefazolin (KZ), Cefoxitin (FOX), Ampicillin Sulbactam (SAM), Piperacillin Tazobactam (TZP), Cefazolin (KZ), Ceftazidime (CAZ), Ceftriaxone (CRO), Cefepime (FEP), Aztreonam (ATM), Amikacin (AK), Levofloxacin (LEV), Erythromycin, and Vancomycin (VA) have high resistance rates in aerobic bacteria (resistance> 80) %); whereas, Clindamycin (DA) has a lower level of resistance (resistance between 0-50%) compared to Metronidazole (MTZ) (resistance between 50-100%) in anaerobic bacteria.

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