



Research Article

AEROBIC VAGINITIS – TRUTH AND MYTH

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Received: July 29, 2016; Revised: August 15, 2016; Accepted: August 16 2016; Published: August 28, 2016

Abstract-Background: Vagina is a microbiological museum where most types of aerobic and anaerobic organisms are present as normal commensals but when there is imbalance in the flora, the individual experiences abnormal vaginal discharge. It's one of worrisome problems that all females in reproductive age group come across at least once in their life. As it causes few morbid complications such as infertility, pelvic inflammatory disease, endometriosis, cuff cellulitis, urethral syndrome, pregnancy loss, preterm labour, increased risk of other STDs, it's important to identify specific etiological agents and their sensitivity for commonly used antibiotics.

Methods: Two hundred vaginal swabs from clinically suspected vaginitis cases taken were used to prepare saline wet mount, pH estimation, Gram stain, Methyl-violet stain, KOH mount and whiff/amine test. The isolates were inoculated on Blood agar, MacConkey agar and Sabouraud dextrose agar and incubated aerobically at 37°C for overnight. Organisms were then identified and antibiotic sensitivity test was performed.

Results: Most common cause of the symptomatic vaginal discharge was Aerobic vaginitis accounting for about 32%. Commonest organisms were *E. coli*, *P. aeruginosa* and *S. aureus*. Most were sensitive to Amikacin except for *P. aeruginosa*, which was sensitive to imipenem and colistin. Vulvo vaginal-candidiasis, bacterial-vaginosis and trichomoniasis was seen in 14.5%, 14% and 6.5% of our cases respectively.

Conclusion: Diagnosis cannot be only relied on clinical approach instead, Microbiological diagnosis is most important for specific treatment to avoid the complications of vaginitis & antibiotic resistance.

Keywords- Abnormal vaginal discharge, *E. coli*, *S. aureus*, *P. aeruginosa*, Aerobic-vaginitis

Citation: Kukanur S. and Bajaj A. (2016) Aerobic Vaginitis – Truth and Myth. Journal of Microbiology Research, ISSN: 0975-5276 & E-ISSN: 0975-9174, Volume 8, Issue 9, pp.-788-790.

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Academic Editor / Reviewer: Dr Sharada T. Rajan, Kalyani Raju

Introduction

Abnormal vaginal discharge is the serious concern among the females of reproductive age group that is between 15 and 45 years, which has a prevalence rate of 30% in India [1]. This has to be taken seriously by the treating doctor as it might lead to few morbid conditions such as infertility, pelvic inflammatory diseases, endometriosis, urethral syndrome, cuff cellulitis, pregnancy loss, increased risk of STDs, preterm labour [2].

Most of the time a presumptive diagnosis is made based on the nature of the discharge, which is often incomplete. This has led to treatment mismanagement, increase in the recurrence rates, and resistant strains of the etiological agents as well [2].

Hence, the present study was conducted to identify the specific aetiological agents causing vaginitis, by simple & rapid methods, which further leads to the appropriate treatment of the condition.

Materials and Methods

In this prospective study, a total of 200 high vaginal swabs from clinically suspected vaginitis cases were taken from the outpatient department of Gynaecology. The vaginal discharge was collected from the posterior fornix and lateral vaginal wall with cotton tipped sterile swabs [3].

All the patients in the reproductive age group with symptomatic vaginal discharge were included. Whereas, patients in whom per speculum and pelvic examination was not possible, menstruating women, those on antimicrobials/anti-fungals (topical/oral), pregnant women, postmenopausal patients, post hysterectomy

patients and those in post-partum period were all excluded [2].

Samples collected were used to prepare saline wet mount, pH estimation, Gram stain, Methyl violet stain, KOH mount and whiff/amine test. The isolates were inoculated on Blood agar, Sabouraud dextrose agar and MacConkey agar, followed by overnight aerobic incubation aerobically at 37°C. Organisms were identified and the isolates were tested for antibiotic sensitivity.

Results and Discussion

All our patients were picked from Out Patient Department of Gynaecology. Women in the reproductive age group formed the study group.

Out of 200 cases, we encountered 32% of aerobic vaginitis, which were diagnosed, with the help of Gram stain, culture and antibiotic sensitivity pattern. We reported 14.5% of vulvovaginal candidiasis, which were diagnosed by pH estimation, KOH mount and culture. 14% of bacterial vaginosis were diagnosed with the help of pH estimation, Whiff test, Clue cells, Gram stain and Nugent score. 6.5% of Trichomoniasis, which were diagnosed by appreciating motility in saline wet mount, staining with Gram stain and Methyl violet staining.

Sixty seven out of 200 cases had aerobic vaginitis. Fifty-four of them had only aerobic vaginitis and 13 of them had Mixed infection, 6 with Trichomoniasis, 4 with vulvovaginal candidiasis and 3 with bacterial vaginosis.

39% of our cases did not reveal any pathogens, 20.5% of them were culture negative and 18.5% of them grew Coagulase negative *Staphylococci*, which are often considered as normal commensals.

Table-1 Age group distribution among patients with Aerobic vaginitis

Age group (in years)	No. of cases studied (n=67)
21 – 25	14(20.8%)
26 – 30	16(23.8%)
31 – 35	14(20.8%)
36 – 40	18(26.8%)
41 – 45	5(7.4%)

Table-2 Organisms isolated

Organism isolated	Single	Mixed	Total
<i>E.coli</i>	13	7	20
<i>P.aeruginosa</i>	9	4	13
<i>S.aureus</i>	9	2	11
<i>Enterococcus</i> spp.	6	4	10
<i>K.pneumoniae</i>	8	2	10
<i>Acinetobacter</i> spp.	4	-	4
<i>P.mirabilis</i>	2	-	2
Coagulase Negative Staphylococci(CONS)	37	-	37

Table-3 Distribution of Mixed isolates among all cases

Organisms	No. of cases (18)
<i>T.vaginalis</i> & <i>Enterococcus</i> spp.	3
<i>T.vaginalis</i> & <i>P.aeruginosa</i>	2
<i>T.vaginalis</i> & Bacterial vaginosis	1
<i>T.vaginalis</i> & <i>C.albicans</i>	1
<i>T.vaginalis</i> & <i>S.aureus</i>	1
Bacterial vaginosis & <i>E.coli</i>	3
<i>C.albicans</i> & <i>E.coli</i>	1
<i>C.albicans</i> & <i>P.aeruginosa</i>	1
Non albicans Candida & <i>K.pneumoniae</i>	1
Non albicans Candida & <i>S.aureus</i>	1
<i>E.coli</i> & <i>P.aeruginosa</i>	1
<i>E.coli</i> & <i>K.pneumoniae</i>	1
<i>E.coli</i> & <i>Enterococcus</i> spp.	1
Total	18

Table-4 Antibiotic sensitivity pattern of Gram positive cocci

Antibiotics	<i>S.aureus</i> (n=11)	CONS(n=37)	<i>Enterococcus</i> spp.(n=10)
Ampicillin (AMP)	4 (36.3%)	21 (56.7%)	8 (80%)
Cefoxitin (CX)	5 (45.4%)	26 (70.2%)	-
Cefalexin (CN)	5 (45.4%)	26 (70.2%)	-
Erythromycin (E)	8 (72.7%)	29 (78.3%)	5 (50%)
Clindamycin (CD)	8 (72.7%)	28 (75.6%)	-
Gentamycin (GEN)	9 (81.8%)	26 (70.2%)	-
Ciprofloxacin (CIP)	8 (72.7%)	24 (64.8%)	-
Amikacin (AK)	11 (100%)	27 (72.9%)	5 (50%)
Ceftriaxone (CTR)	-	-	8 (80%)
Gatifloxacin (GAT)	-	-	8 (80%)
Azithromycin (AZM)	-	-	9 (90%)
High Level Gentamycin (HLG)	-	-	10 (100%)

Table-5 Antibiotic sensitivity pattern of Gram negative bacilli

Antibiotics	<i>Acinetobacter</i> spp.(n=4)	<i>E.coli</i> (n=20)	<i>K.pneumoniae</i> (n=10)	<i>P.mirabilis</i> (n=2)
Amoxycylav (AMC)	1 (25%)	10 (50%)	5 (50%)	2 (100%)
Gentamycin (GEN)	3 (75%)	10 (50%)	8 (80%)	2 (100%)
Amikacin (AK)	3 (75%)	18 (90%)	10 (100%)	2 (100%)
Ceftriaxone (CTR)	3 (75%)	10 (50%)	4 (40%)	2 (100%)
Cotrimoxazole (COT)	3 (75%)	4 (20%)	8 (80%)	1 (50%)
Sparfloxacin (SPX)	2 (50%)	5 (25%)	7 (70%)	2 (100%)
Cefotaxime (CTX)	3 (75%)	9 (45%)	5 (50%)	2 (100%)

Table-6 Antibiotic sensitivity pattern of *P. aeruginosa* (n=13).

Antibiotics	Sensitive	Resistant
Amoxycylav (AMC)	7 (53.8%)	6 (46.1%)
Gentamycin (GEN)	4 (30.7%)	9 (69.2%)
Ciprofloxacin (CIP)	9 (69.2%)	4 (30.7%)
Amikacin (AK)	6 (46.1%)	7 (53.8%)
Ceftriaxone (CTR)	4 (30.7%)	9 (69.2%)

Cotrimoxazole (COT)	6 (46.1%)	7 (53.8%)
Sparfloxacin (SPX)	6 (46.1%)	7 (53.8%)
Cefoperazone/ Sulbactam (CFS)	7 (53.8%)	6 (46.1%)
Piperacillin/ Tazobactam (PIT)	9 (69.2%)	4 (30.7%)
Ceftazidime (CAZ)	7 (53.8%)	6 (46.1%)
Meropenem (MRP)	4 (30.7%)	9 (69.2%)
Ceftriaxone/ Tazobactam (CIT)	6 (46.1%)	7 (53.8%)
Tobramycin (TOB)	3 (23.0%)	10 (76.9%)
Imipenem (IMP)	12 (92.3%)	1 (7.69%)
Colistin (CL)	13 (100%)	0 (0%)

Table-7 Distribution of various types of vaginal infection among all cases

Diagnosis	No. of cases
Aerobic vaginitis (AV)	51 (25.5%)
Bacterial vaginosis (BV)	24 (12%)
Vulvovaginal candidiasis (VVC)	24 (12%)
Trichomoniasis (TV)	5 (2.5%)
Mixed (AV & TV)	6 (3%)
Mixed (AV & VVC)	4 (2%)
Mixed (AV & BV)	3 (1.5%)
Mixed (AV & BV)	3 (1.5%)
Mixed (TV & BV)	1 (0.5%)
Mixed (TV & VVC)	1 (0.5%)
Normal	78 (39%)
Total	200 (100%)

Discussion

Aerobic vaginitis is under-diagnosed in clinical practice as very little is known about it. Moreover, as mentioned earlier, it leads to many morbid complications like, infertility, miscarriage, PROM, chorioamnionitis, preterm delivery and pelvic inflammatory disease (PID) [15]. PID which includes aerobic infections is one of the important causes of tubal infertility. Since the availability of diagnostic tools are limited in developing countries, AV is unrecognized clinically. [15]

Diverse studies carried out with the objective of estimating the frequency of aetiological factors for vaginitis have shown widely varying results.

The indices found for Bacterial vaginosis have varied between 6.6% & 75.8% [1, 4-10, 15] and in our study we have reported 14% which is well within limits.

We encountered 32% of Aerobic vaginitis which conforms with various studies that show the indices between 24% & 51%, [2,9].

Vulvovaginal candidiasis prevalence rates vary between 3.9% & 39.5% [2, 4, 7-9, 11] as stated by various studies but our study shows it to be 14.5% which is satisfactory.

Indices of Trichomoniasis are between 2% & 18.1% [2, 4, 7-9, 11] but we observed it in 6.5% of our cases which is again in the acceptable limits.

As shown in [Table-8], we have isolated 18.6% of *E. coli*, 12% of *P. aeruginosa*, 10.2% of *S. aureus*, 9.3% of *Enterococcus* spp. and *K. pneumoniae* each, 3.7% of *Acinetobacter* spp., 1.8% of *P. mirabilis* and 34.5% of CONS, which are well within defined limits.

The role of *E. coli* as a pathogen of vaginitis is debateable and is known to cause neonatal sepsis and chorioamnionitis [9].

Consumption of over the counter drugs and self medication of antibiotics (beta lactam antibiotics) has increased the occurrence of *K. pneumoniae* in cases of vaginitis. Extended spectrum beta lactamases are produced by most of the Klebsiella isolates which pose to further antibiotic resistance. It also accounts for the absence or decrease in lactobacilli population and affect their defense factors [14].

Our sensitivity patterns of aerobic bacterial isolates are comparable to the study done by Shamim Mumtaz et al, [13] where most of the Gram-positive cocci were sensitive to amikacin and resistant to ampicillin. Most of the Gram-negative organisms were sensitive to Amikacin and resistant to amoxycylav. Most of *P. aeruginosa* spp were sensitive to imipenem and resistant to Gentamycin.

Antibiotic susceptibility pattern of *Acinetobacter* spp and *P. mirabilis* was not commented upon as they are very less in number.

Table-8 Comparison of pathogens causing Aerobic vaginitis in various studies

Studies	Ismaeel Khan et al[12]	ShamimMumtaz et al[13]	Mohammad Sabri A Razzak et al[14]	Lakshmi K et al[11]	Samia S Khamees et al[7]	Present study
<i>E.coli</i>	21%	13.67%	16.2%	15.2%	13.83%	18.6%
<i>P.aeruginosa</i>	2%	7.25%	8.1%	-	9.57%	12.1%
<i>S.aureus</i>	2%	46.1%	18.9%	8.7%	21.28%	10.2%
<i>Enterococcus Spp</i>	31%	9%	-	6.5%	11.7%	9.3%
<i>K.pneumoniae</i>	3%	10.5%	8.1%	0%	13.48%	9.3%
<i>Acinetobacter spp</i>	-	1.36%	6.8%	-	1.06%	3.7%
<i>P.mirabilis</i>	-	1.36%	-	-	5.32%	1.8%
CONS	7%	-	-	21.7%	-	34.5%

Table-9 Comparison of Percentage of sensitivity of Gram Positive Aerobic vaginal isolates to various antibiotics.

Antibiotics	<i>S.aureus</i>		<i>Enterococcus spp.</i>	
	Shamim Mumtaz et al[13]	Present study	Shamim Mumtaz et al[13]	Present study
Ampicillin	26.3%	36.3%	63.8%	80%
Ciprofloxacin	65.51%	72.7%	-	-
Gentamycin	67.6%	81.8%	43.5%	100%
Amikacin	76.9%	100%	-	-
Methicillin	69.3%	45.4%	-	-

Table-10 Comparison of Percentage of sensitivity of Gram Negative Aerobic vaginal isolates to various antibiotics

Antibiotics	<i>E.coli</i>		<i>K.pneumoniae</i>	
	Shamim Mumtaz et al[13]	Present study	Shamim Mumtaz et al[13]	Present study
Amoxycalv	46.8%	50%	60.29%	50%
Cephataxime	73.9%	45%	79.1%	50%
Gentamycin	65.4%	50%	62.8%	80%
Amikacin	81.3%	90%	-	100%
Cotrimoxazole	21.5%	20%	61.8%	80%

Table-11 Comparison of Percentage of sensitivity of *Pseudomonas aeruginosa* Aerobic vaginal isolates to various antibiotics

Antibiotics	<i>Pseudomonas aeruginosa</i>	
	ShamimMumtaz et al[13]	Present study
Piperacillin/Tazobactam	94.4%	69.2%
Imipenem	90.7%	92.3%
Meropenem	91.7%	30.7%
Ciprofloxacin	78.7%	69.2%
Gentamycin	36.7%	30.7%
Amikacin	84.6%	46.1%

Conclusion

In the present study, aerobic vaginitis was the predominant cause for abnormal vaginal discharge, followed by vulvovaginal candidiasis, bacterial vaginosis and trichomoniasis. Therefore, diagnosis should be confirmed by identification and antibiotic susceptibility testing for the specific treatment of the cases diagnosed to avoid morbid complications and antibiotic resistance.

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