



Investigation of Vaginal Infections among Symptomatic Women Referred to Gynecology Clinics in Chaharmahal and Bakhtiari Province of Iran in 2017

Hossein Hashemi¹, Hossein Fazel², Jaleh Varshousaz³, Hossein Mirhendi¹, Mostafa Chadeganipour¹, Seyedeh Maryam Sharafi¹, Zahra Aliyari⁴ and Hossein Yousofi Darani^{1*}

¹Department of Parasitology and Mycology, Isfahan University of Medical Sciences, Iran

²Department of Microbiology, Isfahan University of Medical Sciences, Iran

³Department of Pharmaceutics, Isfahan University of Medical Sciences, Iran

⁴Department of Parasitology and Mycology, Shahrood University of Medical Sciences, Iran

Abstract

Background: Vaginal infections are common problems among women worldwide. In this work candidal, trichomonal and bacterial causing agents of vaginal infection were differentially diagnosed and sign and symptoms in infected women were investigated.

Method: 635 symptomatic women with vaginitis referred to gynecology clinics in Chaharmahal and Bakhtiari Province of Iran in 2017 were included in this work. Causing agents were diagnosed using microscopy and culture methods. Sign and symptoms including itching, color, pH and odor of discharges were recorded. KOH test was also performed for samples. Antibiotic test was performed for all cases of bacterial vaginitis.

Results: According to culture 31.4%, 63.7% and 4.7% were infected with *Gardnerella vaginalis*, *Candida* spp and *Trichomonas vaginalis* respectively. 44% of women had itching; in 34% of discharge the KOH test was positive. Clue cells and WBC were observed in 22% and 56% of specimens respectively. In bacterial vaginitis cases Metronidazole was the most sensitive and Nalidic acid was the most resistant antibiotics.

Conclusion: *Candida* spp. Were the first cause of vaginal infection and according to sign and symptoms it is not possible to differentiate the causing agents of vaginal infection.

Keywords: Vaginal infections; Symptoms; *Gardnerella vaginalis*; *Candida* spp; *Trichomonas vaginalis*

OPEN ACCESS

*Correspondence:

Hossein Yousofi Darani, Department of Medical Parasitology and Mycology, Isfahan University of Medical Sciences, Isfahan, Iran,
E-mail: Yousofidarani@gmail.com

Received Date: 28 Jun 2021

Accepted Date: 14 Jul 2021

Published Date: 19 Jul 2021

Citation:

Hashemi H, Fazeli H, Varshousaz J, Mirhendi H, Chadeganipour M, Sharafi SM, et al. Investigation of Vaginal Infections among Symptomatic Women Referred to Gynecology Clinics in Chaharmahal and Bakhtiari Province of Iran in 2017. Ann Gynecol Obstetr Res. 2021; 4(1): 1020.

Copyright © 2021 Hossein Yousofi

Darani. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Introduction

The genital tract infection is one of the most common problems among women [1]. According to WHO reports, three candidal, trichomonal and bacterial agents are the main causes of vaginitis [2]. Bacterial Vaginosis (BV) is the most prevalent vaginal disorder in women of reproductive age [3]; it is caused mainly by *Gardnerella vaginalis* [4] which is present in up to 95% of cases of BV [3].

BV is the most common cause of abnormal vaginal discharge among women of reproductive age and has been implicated as a cause of pelvic inflammatory disease and preterm delivery of low birth-weight infants [5,6]. It has been shown that all 93 clinical isolates of *Gardnerella vaginalis* were susceptible to penicillin, ampicillin, erythromycin, clindamycin, chloramphenicol, and trimethoprim [7].

Diagnosis has been based on clinical Amsel criteria and direct Gram stain of vaginal secretions. The molecular technique has the highest predictive value for the diagnosis of BV, with excellent sensitivity (95%), specificity (99%), and positive (95%) and negative 99% [8].

The other cause of vaginal infection is *Trichomonas vaginalis*, a common sexually transmitted protozoal infection, which infect about 180 million women annually worldwide [9]. The third form of vaginal infection is *Candida vaginitis*. It has been shown that approximately 75% of sexually active women suffer at least one episode of *Candida vaginitis* [10].

Prevalence of vaginal infection varies in different area and depending on factors [11-13]. In this investigation vaginal infections in women referred to gynecology clinics in Chaharmahal and Bakhtiari Province of Iran in 2017 have been investigated.

Material and Methods

In this descriptive investigation, population studies were symptomatic women with vaginitis referred to gynecology clinics in Chaharmahal and Bakhtiari Province of Iran in 2017. For sample collection, after obtaining written consent from each patient a swab form vaginal discharge was collected during vaginal examination. The vaginal specimens were then examined in standard microbiological analysis including microscopy, culture and antimicrobial susceptibility testing. A questioner form containing demographic indices and discharges characterizations also filled for every person. Discharges were characterized according to appearance, pH, clue cells and Amine test.

Colombia agar medium, Sabra dextrose agar and TYSI33 mediums were used for culturing *Gardnerella vaginalis*, *Candida* spp and *Trichomonas vaginalis* microorganisms respectively. For microscopic analysis each vaginal swab was mixed with one drop of isotonic saline on a microscopic slide. Following covering with a cover slip, the slides were then observed under light microscope. For gram staining, for every vaginal swab a slide smear was made and stained with gram stain. For KOH test, to a sample of vaginal discharge several drops of 10% potassium hydroxide was added. Presence of a strong fishy odor was considered as positive result. pH of the discharges was estimated using pH papers indicators.

Antibiogram was performed using disc diffusion method. Microbial suspension was made in sterile normal saline and followed by estimation of bacterial number (0.5 McFarland method). The bacteria were then cultured in blood agar culture medium and then Azitromycin, Ciprofloxacin, Rifampin, Penicillin, Clindamycin, Erythromycin, Metronidazole and Nalidic acid were added and incubated at 37 for 48 h. After that the dimension of the rings were measured using a ruler. Descriptive data have been presented in tables and Chi square test was used for analysis of the data.

Results

In this work 635 women were included in the study from whom 45 cases were under 20 years old and 590 cases (92.9%) were more than 20 years old. More than 44% of these women had itching and most of them had unusual discharges. Characterization of discharges of these women and presence of itching has been summarized in Table 1. Analysis of data showed that in cases with bacterial vaginitis the frequency of itching and the number of clue cells and WBC were significantly greater than non- bacterial vaginitis cases ($P<0.001$). Also, in bacterial vaginitis the frequency of Positive KOH test and presence of yellow discharges was significantly higher in than in cases of non-bacterial vaginitis ($P<0.001$).

Discharges of the women were also investigated according to their odor and pH and the results have been summarized in Table 2.

The discharges were then subjected to microscopy, culture and biochemical tests for diagnosis of causing agents. Results of microscopy and culture have been summarized in Table 3 and the results of KOH test and WBC and clue cells counts have been summarized in Table 4. All 200 samples that were diagnosed as bacterial vaginitis were subjected to antibiogram tests too and the

Table 1: Itching and discharges in 635 symptomatic women referred to gynecology clinics in Chaharmahalva Bakhtiari province of Iran in 2017.

Symptoms	Result	Number	Percent
Itching	Positive	280	44.1
	Negative	355	55.9
Color of discharges	Gray	79	12.4
	Clear	82	12.9
	White	78	12.3
	Yellow	396	62.4
Appearance of discharges	Cloudy	535	84.3
	Transparent	74	11.6
	Foamy	26	4.1

Table 2: Odor and PH of discharges of 635 symptomatic women referred to gynecology clinics in Chaharmahalva Bakhtiari province of Iran in 2017.

Variable	Result	Number	Percent
Odor	Positive	431	67.9
	Negative	204	32.1
pH	<4.5	507	79.8
	>4.5	128	20.2

Table 3: Results of microscopy examination and KOH of discharges of 635 symptomatic women referred to gynecology clinics in Chaharmahalva Bakhtiari province of Iran in 2017.

	<i>Trichomonas vaginalis</i>		<i>Gardnerella vaginalis</i>		<i>Candida</i> spp	
	Number	Percent	Number	Percent	Number	Percent
Microscopy	11	1.73	98	15.4	512	80.6
Culture	30	4.72	200	31.4	405	63.7

Table 4: Results of microscopy KOH test and WBC and clue cells counts in 635 symptomatic women referred to gynecology clinics in Chaharmahalva Bakhtiari province of Iran in 2017.

Laboratory tests	Results	Number	Percent
(KOH test)	Positive	220	34.6
	Negative	415	65.7
Clue cell	Positive	141	22.2
	Negative	494	77.8
WBC	<5	355	55.9

results have been summarized in Table 5.

Discussion

In this work characterization of vaginal infections among 635 symptomatic women referred to gynecology clinics in Chaharmahal and Bakhtiari Province of Iran in 2017 were investigated. According to the culture results 63.7%, 31.4%, and 4.72% of women were infected with *Candida* spp., *Gardnerella* and *Trichomonas vaginalis* respectively.

Different investigation showed that the first, second and third causes of vaginal infections are bacteria, *Candida* and *trichomonas* respectively [14]. As an example Erminia Casari reported that *Gardnerella vaginalis* was the main cause of vaginal infections among fertile women (26.6%), and the second causes was *Candida* species (12.1%) [14]. However, our results showed that *Candida* spp are the main cause of vaginal infections. This difference may be due to the study population in different investigations.

Table 5: Antibiogram of samples with vaginal bacterial in 635 symptomatic women referred to gynecology clinics in Chaharmahala Bakhtiari province of Iran in 2017.

Antibiotic	Result	Number	Percent
Azitromycin	Sensitive	79	39.5
	Resistant	121	60.5
Ciprofloxacin	Sensitive	47	23.5
	Resistant	153	76.5
Rifampin	Sensitive	39	19.5
	Resistant	161	80.5
Penicillin	Sensitive	35	17.5
	Resistant	165	82.5
Clindamycin	Sensitive	44	22
	Resistant	156	78
Erythromycin	Sensitive	29	14.5
	Resistant	171	85.5
Metronidazole	Sensitive	113	56.5
	Resistant	87	43.5
Nalidic acid	Sensitive	15	7.5
	Resistant	185	92.5

Discharge and itching are common symptom associated with vaginal infection [15]. In our investigation we showed that 44% of 635 investigate women had itching and most of them had discharge. However, these symptoms are not helpful for differential diagnosis of vaginal infections. In microscopical examination of vaginal infections presence of clue cells and WBC are in favor of bacterial vaginitis [16,17]. In our work 31.4% of 635 women had bacterial vaginitis while about 22% had clue cells and about 60% had WBC. These finding showed that presence of clue cells and WBC in vaginal infections are not a precise indication for diagnosis of bacterial vaginitis.

Examination of KOH in vaginal infections is a common test for diagnosis of bacterial vaginitis [16]. In our research we showed that in 35% of women results of KOH of vaginal discharges were positive and 31.4% had bacterial vaginitis. So, KOH test may be a good clue for detection of bacterial vaginitis.

It has been shown that vaginal pH determination is relatively sensitive, but less specific in detection of bacterial vaginitis [17]. Our results showed that about 80% of woman had pH less than 4.5 and 20% had pH more than 4.5. These finding shows that estimation of pH of vaginal discharge is not good indication for differential diagnosis of vaginal infections agents.

In our work Results of antibiogram tests showed that that Nalidic acid was the most resistant and Metronidazole was the most sensitive antibiotics for treatment of *Gardnerella vaginalis*. Ellie J. C. Goldstein showed that Twenty-eight percent of isolates of bacterial vaginitis (31 of 108) were resistant to metronidazole, and 44% were resistant to doxycycline. All were susceptible to clindamycin and ampicillin-sulbactam [18]. In another work antibiotic sensitivity pattern showed that all isolates of *G. vaginalis* were sensitive to imipenem and meropenem. Amikacin and gentamicin were also effective in 91.25% and 87.76% followed by nitrofurantoin, cefotaxime and nalidixic acid 73.12%, 61.87% and 55.62% respectively. High drug resistance was observed in the case of ampicillin, only 9.37% isolates were susceptible to ampicillin [19].

In another work it has been shown that Amikacin (89.6%), Norfloxacin (75.6%), Ciprofloxacin (66.2%) and Gentamycin (68.4%) had high levels of susceptibility for treatment of bacterial vaginitis. Whereas high resistance rates were observed for Amoxicillin (83.3%), Tetracycline (65.4%) and Cotrimoxazole (62.7%) [20].

Conclusion

Results of this work revealed the candida spp are the first causes of vaginal infection. Vaginal infections with different causing agents may have similar signs and symptoms and so for effective treatment differential diagnosis of causing agents using laboratory methods is recommended.

References

1. Sobel JD. Epidemiology and pathogenesis of recurrent vulvovaginal candidiasis. Am J Obstet Gynecol. 1985;152(7):924-35.
2. Adad SJ, Lima RVD, Sawan ZTE, Silva MLG, Souza MA, Saldanha JC, et al. Frequency of *Trichomonas vaginalis*, *Candida* sp and *Gardnerella vaginalis* in cervical-vaginal smears in four different decades. Sao Paulo Med J. 2001;119(6):200-5.
3. Patterson JL, Stull-Lane A, Girerd PH, Jefferson KK. Analysis of adherence, biofilm formation and cytotoxicity suggests a greater virulence potential of *Gardnerella vaginalis* relative to other bacterial-vaginosis-associated anaerobes. Microbiology (Reading). 2010;156(Pt 2):392-99.
4. Greenwood J, Pickett MJ. Transfer of *Haemophilus vaginalis* Gardner and Dukes to a New Genus, *Gardnerella*: *G. vaginalis* (Gardner and Dukes) comb. Microbiology. 1980;30(1):170-8.
5. Sweet RL. Role of bacterial vaginosis in pelvic inflammatory disease. Clin Infect Dis. 1995;20(Suppl 2):S271-S5.
6. Hauth JC, Goldenberg RL, Andrews WW, DuBard MB, Copper RL. Reduced incidence of preterm delivery with metronidazole and erythromycin in women with bacterial vaginosis. N Engl J Med. 1995;333(26):1732-6.
7. Kharsany A, Hoosen AA, Van den Ende J. Antimicrobial susceptibilities of *Gardnerella vaginalis*. Antimicrob Agents Chemother. 1993;37(12):2733-5.
8. Menard JP, Fenollar F, Henry M, Bretelle F, Raoult D. Molecular quantification of *Gardnerella vaginalis* and *Atopobium vaginae* loads to predict bacterial vaginosis. Clin Infect Dis. 2008;47(1):33-43.
9. Miller WC, Swygard H, Hobbs MM, Ford CA, Handcock MS, Morris M, et al. The prevalence of trichomoniasis in young adults in the United States. Sex Transm Dis. 2005;32(10):593-8.
10. Radonjic IV, Dzamic AM, Mitrovic SM, Arsenijevic VSA, Popadic DM, Kranjcic I. Diagnosis of *Trichomonas vaginalis* infection: The sensitivities and specificities of microscopy, culture and PCR assay. Eur J Obstet Gynecol Reprod Biol. 2006;126(1):116-20.
11. Myziuk L, Romanowski B, Johnson SC. BVBlue test for diagnosis of bacterial vaginosis. J Clin Microbiol. 2003;41(5):1925-8.
12. Holst E, Wathne B, Hovelius B, Mårdh PA. Bacterial vaginosis: Microbiological and clinical findings. Eur J Clin Microbiol. 1987;6(5):536-41.
13. Eschenbach DA, Hillier S, Critchlow C, Stevens C, DeRouen T, Holmes KK. Diagnosis and clinical manifestations of bacterial vaginosis. Am J Obstet Gynecol. 1988;158(4):819-28.
14. Casari E, Ferrario A, Morenghi E, Montanelli A. *Gardnerella*, *Trichomonas vaginalis*, *Candida*, *Chlamydia trachomatis*, *Mycoplasma hominis* and *Ureaplasma urealyticum* in the genital discharge of symptomatic fertile and asymptomatic infertile women. New Microbiol. 2010;33(1):69.
15. O'Dowd T, West RR. Clinical prediction of *Gardnerella vaginalis* in general practice. J R Coll Gen Pract. 1987;37(295):59-61.

16. Coppolillo EF, Perazzi BE, Famiglietti AM, Eliseht MGC, Vay CA, Barata AD. Diagnosis of bacterial vaginosis during pregnancy. *J Low Genit Tract Dis.* 2003;7(2):117-21.
17. Hemalatha R, Ramalaxmi BA, Swetha E, Balakrishna N, Mastromarino P. Evaluation of vaginal pH for detection of bacterial vaginosis. *Indian J Med Res.* 2013;138(3):354.
18. Goldstein EJ, Citron DM, Merriam CV, Warren YA, Tyrrell KL, Fernandez HT. *In vitro* activities of Garenoxacin (BMS 284756) against 108 clinical isolates of *Gardnerella vaginalis*. *Antimicrob Agents Chemother.* 2002;46(12):3995-6.
19. Bhooshan S, Gupta S, Agarwal A, Kumar P. Antibiotic resistance-renewed fear in *Gardnerella vaginalis* and its role in bacterial vaginosis. *J Dent Medical Sci.* 2016;15(7):63-6.
20. Ravishankar N, Prakash M. Antibiogram of bacterial isolates from high vaginal swabs of pregnant women from tertiary care hospital in Puducherry, India. *Int J Curr Microbiol App Sci.* 2017;6(1):964-72.