Investigation and Analysis of 49343 Case Women's Vaginal Microecology

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Abstract

Background: We aimed to investigate the pathogen infection in vaginal secretions of women in Linyi area.

Methods: From October 2016 to September 2018, a total of 49,343 vaginal secretion specimens from women who attended Women and Children's Health Care Hospital of Linyi District, Shandong Province, China were used to detect the cleanliness, *Candida*, clue cells, *Trichomonas*, etc. with Ultra-high power microscopy.

Results: Among the 49343 patients, 6377 had vaginal cleanliness of degree I ~ II, the detection rate was 37.89%; 10455 cases of III ~ IV degree, the detection rate was 62.11%; 13193 cases of simple vaginal pathogen infection, the detection rate was 26.74%. Among them, 9256 cases of vaginal *Candida* (VVC) had a detection rate of 18.76%; 3176 cases of Bacterial vaginosis (BV) had a detection rate of 6.44%; and 761 cases of *Trichomonas* infection (TV) had a detection rate 1.54%; 899 cases of mixed infection. The detection rate was 1.82% and the detection rate of each pathogen in the 18-30 year old group was the highest. The detection rates of VVC, BV, TV and MVI were 10.80%, 3.25%, 0.65%, 1.00%, repsectively.

Conclusion: The incidence of VVC women with vaginitis in Linyi was the highest, and the incidence was mainly between 18 and 40 years old. The infection rate of VVC, BV and MVI pathogens was the highest in summer, and the infection rate of TV was the highest in autumn.

Keywords: Vaginal secretions; *Candida*; Vaginitis; *Trichomonas*

Introduction

Under normal circumstances, the vaginal microecosystem is mainly composed of dominant flora such as *Lactobacillus* (1). Under the influence of various factors such as exogenous and endogenous factors, it causes the destruction of the micro-ecological environment balance between the vsaginal flora and the human body, which leads to vaginal microecological imbalance, and then causes vaginal inflammation.

Common vaginal microecological disorders include vulvovaginal *Candida* (VVC), bacterial vaginosis (BV), trichomonad vaginitis (TV), aerobic vaginitis (AV) and mixed vaginitis (MVI) and so on. In recent years, vaginal microecology has re-

ceived increasing attention. The vaginal microe-cological composition of women of different ages is different (2-5), and the distribution of vaginitis pathogens in different regions is also different (6-10).

We analyzed the vaginal secretions of 49,343 patients who came to our hospital to explore the composition ratio, age distribution and seasonal distribution of various vaginal microecological disorders to guide clinicians in the prevention and treatment of vaginal microecological disorders.

Materials and Methods

Research objects

The 49,343 patient specimens in this data were all from women who attended Linyi Women and Children's Health Care Hospital of Linyi District, Shandong Province, China from October 2016 to September 2018. The clinical manifestations were different degrees of vaginitis symptoms (such as genital itching, increased discharge, peculiar smell, etc.).

The study was approved by the Ethics Committee of the Women and Children's Health Care Hospital of Linyi. Signed informed consents were obtained from the patients and/or guardians.

Specimen collection

Sexual intercourse, vaginal medication, and local lavage were prohibited 24 hours before sampling, and menstrual periods were excluded. The gynecologist used two sterile cotton swabs to rotate on the posterior fornix of the patient's vagina for 10-20 seconds. One tube was placed in a sterile saline test tube for routine testing of vaginal secretions, and the other tube was used for dry chemical index testing with 3-6 drops of dry chemical enzymatic dilution in the test tube, and was sent for inspection immediately.

Physiological saline wet sheet method and KOH wet film method

0.9% sterile normal saline, 10% KOH, SHIDASI Ultra High Power Microscope were used.

To perform this test, 2 slide preparations are made: the first by mixing a small sample of the discharge with a few drops of fresh, normal (0.9%) saline, and the second by mixing a second sample with a few drops of 10% potassium hydroxide (KOH) solution. A cover slip is then applied. The specimen is examined under both low- and high-power objectives.to observe the cleanliness of the patient's vaginal microecology, white blood cells, bacteria, fungal spores and bacterial infection indicators such as silk, trichomoniasis, and clue cells.

Judgment of the results of ultra-high magnification microscopy

According to the diagnostic criteria of vaginitis in "Vaginitis: Diagnosis and Management" written by Martin Quan MD (11):

Vulvovaginal candida disease (VVC): The diagnosis can be made if the spores or/and hyphae of Candida spores or/and hyphae are found under ultra-high magnification of vaginal secretions.

Trichomonas vaginitis (TV): It can be diagnosed by seeing *T. vaginalis* under ultra-high magnification of vaginal secretions. Bacterial vaginosis (BV): 1) Homogeneous and thin vaginal secretions; 2) The pH value of the vagina ≥4.5; 3) The secretion microscopic examination of the clue cells is positive (the clue cells account for more than 20% of all epithelial cells). Bacterial vaginosis can be diagnosed if these three items are met.

Statistical analysis

We used SPSS l9.0 (IBM Corp., Armonk, NY, USA). The results were all tested using X^2. If *P*<0.05, there was a statistical difference.

Results

Vaginal cleanliness of 49,343 women in Linyi area

For 49,343 women in Linyi area, there were 16859 cases with degree Ⅰ ~ Ⅱ, accounting for about 34.17%, and 32,484 cases with degree Ⅲ ~ Ⅳ, accounting for about 65.83% (Table 1).

Table 1: Vaginal cleanliness of 49,343 women in Linyi area

Vaginosis microecology	Number of cases (n)	The detection rate (%)
Cleanliness I degree + II degree	16859	34.17
Cleanliness III degree +IV degree	32484	65.83
Total	49343	100

The number, composition ratio and detection rate of various vaginal microecological disorders

Overall, 14092 cases of pathogens were detected in total, with a total detection rate of 28.56%.

Among them, *Candida* vaginalis (VVC) has the highest detection rate, followed by bacterial vaginosis (Table 2).

Table 2: Vaginal microecological infection in 49343 case women in Linyi

Vaginosis microecology	Number of cases (n)	Composition ratio (%)
Simple VVC	9256	18.76
Simple BV	3176	6.44
Simple TV	761	1.54
MVI	899	1.82
All negative	35251	71.44
Total	49343	100

The detection rate of vaginal microecological disorders at different ages

Overall, 49,343 patients were divided into 4 groups according to their ages, including 18-30, 31-40, 41-50, and >50 years old. The infection rate of each pathogen was the highest in the 18-30 year old group. The positive rate of VVC was significantly different between the 18-30 years old group and the other three groups ($X^2=40.512$, $P<0.05$), but there was no significant difference among the other three groups. The positive rate of BV in 18-30 years old group and 31-40 years old group was significantly different from other two groups ($X^2=70.514$, $P<0.05$), but there was no significant difference between 18-30 years old group and 31-40 years old group. There was no significant difference between 41-50 years old group and > 50 years old group. The positive rate of TV in 18-30 years old group and 31-40 years old group was significantly different from the other two groups ($X^2=134.078$, $P<0.05$), and there was also significant difference between 18-30 years old group and 31-40 years old group ($X^2=134.078$, $P< 0.05$). The positive rate of MVI was significantly different between 31-40 years old group and 41-50 years old group ($X^2=10.695$, $P < 0.05$) (Table 3).

Table 3: Infection of various pathogens in patients of different ages

Age	Total number (n)	VVC		BV		TV		MVI		Total number of infections (n)	Total infection rate (%)
		Nmber (n)	Positive rate (%)	Number (n)	Positive rate (%)	Number (n)	Positive rate (%)	Number (n)	Positive rate (%)		
18 ~ 30	27102	5328	10.80	1602	3.25	320	0.65	488	1.00	7738	15.68
31 ~ 40	16453	2976	6.03	1060	2.15	255	0.52	276	0.56	4567	9.26
41 ~ 50	4511	754	1.53	406	0.82	153	0.31	103	0.21	1416	2.87
>50	1277	198	0.40	108	0.22	33	0.06	32	0.05	371	0.75
Total	49343	9256	18.76	3176	6.44	761	1.54	899	1.82	14092	28.56

The detection rate of vaginal microecological disorders at different seasons

The infection rates of VVC, BV and MVI pathogens were the highest in summer, and TV infection rate was the highest in autumn. The positive rate of VVC was significantly different between spring, summer and winter (X 2=40.92, *P*<0.05), summer and winter (X 2=40.92, *P*<0.05) and autumn and winter (X 2=40.92, *P* < 0.05). There was no significant difference in the positive rate

of BV in four seasons (X 2=1.235). The positive rate of TV in spring and summer was significantly different from that in autumn and winter (X 2=104.757, *P*<0.05), and also in autumn and winter (X 2=104.757, *P*<0.05), but there was no significant difference between spring and summer. There was no significant difference in MVI positive rate among four seasons (X 2=3.842) (Table 4).

Table 4: Infection of various pathogens in patients of different seasons

Seasons	Total number (n)	VVC		BV		TV		MVI		Total number of infections (n)	Total infection rate (%)
		Nmber (n)	Positive rate (%)	Number (n)	Positive rate (%)	Number (n)	Positive rate (%)	Number (n)	Positive rate (%)		
Spring	12080	2127	4.31	785	1.59	139	0.28	228	0.46	3279	6.64
Summer	14827	2798	5.67	967	1.96	144	0.29	288	0.58	4197	8.51
Autumn	11520	2075	4.21	746	1.51	274	0.56	205	0.42	3300	6.69
Winter	10916	2256	4.57	678	1.38	204	0.41	178	0.36	3316	6.72
Total	49343	9256	18.76	3176	6.44	761	1.54	899	1.82	14092	28.56

The detection rate of mixed vaginal microecological disorders at different ages

The mixed infection rate of pathogens in 18 ~ 30 years old group was the highest (Table 5).

Table 5: Distribution of mixed vaginitis in different age groups

Age	Total number (n)	BV+VVC+TV		BV+VVC		BV+TV		VVC+TV		Total number of infections (n)	Total infection rate (%)
		Nm ber (n)	Positive rate (%)	Num ber (n)	Positive rate (%)	Num ber (n)	Positive rate (%)	Num ber (n)	Positive rate (%)		
18 ~ 30	27102	1	0.002	425	0.86	62	0.13	0	0	488	0.99
31 ~ 40	16453	1	0.002	228	0.46	47	0.10	0	0	276	0.56
41 ~ 50	4511	1	0.002	69	0.14	33	0.07	0	0	103	0.21
>50	1277	1	0.002	21	0.04	10	0.02	0	0	32	0.06
Total	49343	4	0.008	743	1.51	152	0.31	0	0	899	1.82

Discussion

The balance of vaginal micro ecological environment plays an important role to the female reproductive health. With the increase in the level of testing and people's attention, our research shows that the detection rate of vaginal microecological disorders is on the rise, and various vaginal microecological disorders are detected and the situation changes year by year. For example, vulvovaginal candidiasis has a decreasing trend year by year, while bacterial vaginosis has an increasing trend year by year.

Horizontal observation and comparative analysis show that the composition ratio and detection rate of vaginal microecological disorders differ greatly in different countries and regions. The British survey showed that the proportion of bacterial vaginosis was 25.6% (12), in Sub-Saharan Africa 31-50% (13), and in Northwest Tanzania up to 62% (14). The composition ratio and detection rate of the vaginal micro ecological balance in China also have their own characteristics.

In Xiao et al (15) study, vulvovaginal false silk yeast accounted for 21.87%; and bacterial vaginosis (BV) for 10.44%. Wang et al (16) reported 4449 cases of vaginal micro ecological and vulvovaginal false silk yeast accounted for 5.53%; *Trichomonas* vaginitis for 1.82%; bacterial vaginosis (BV) for 11.80%; and intermediate type BV for 28.43%. In a study, vulvovaginal false silk yeast accounted for 7.85%; *Trichomonas* vaginitis

for 0.16%; bacterial vaginosis (BV) for 11.26%; and intermediate type BV for 23.47% (17).

This means that there are certain differences in the distribution of different regions. Different surveys have certain differences in time and seasons, and the distribution of vaginal inflammation varies in different seasons. The level of testing and the level of doctors vary among the people in different hospitals. There are differences in climate and sanitary environment in different regions, people in different regions have different levels of propaganda about the prevention and treatment of vaginal inflammation, and there are also differences in people's understanding.

Our results are consistent with the data reported abroad (18), where there were 899 cases of mixed infection and the detection rate was 1.82%. Women at different ages have different physiological characteristics and hormonal changes, which affect the composition of the vaginal microecology. Our study shows that the detection rate of the pathogens in the 18-30-year-old group was the highest, which may be related to the level of estrogen, frequent sexual activities, physiological status and behavior habits in this age group. Vaginitis is a result of the lesions caused by multiple factors, through early prevention, early detection, early treatment and a certain degree of health education, can reduce the incidence of a disease, and then improve women's physical and mental health.

Conclusion

The incidence of VVC among women and children with vaginitis in Linyi was the highest, and the incidence was mainly between 18 and 40 years old. It shows that some sanitary measurement should be taken to prevent of such infections.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

Conflict of interest

The authors declare that there is no conflict of interest.

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