

# Pap Smears: Frequency of *Gardnerella Vaginalis*, *Candida* spp., *Trichomonas Vaginalis* and Pill Use or Copper Intrauterine Device Use

ORIGINAL

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## Abstract

**Objective:** To verify the frequency of *Gardnerella vaginalis*, *Candida* sp. *Trichomonas vaginalis* in pap smears and the presence of these when using the copper intrauterine device or the oral contraceptive.

**Method:** The analysis of 119,312 examinations of women seen by the public health system in the Northeast region of Brazil from the period from January 2006 to December 2010. The variables analyzed were age, frequency of microorganisms, contraceptive use, type of contraception adopted correlated with the presence of microorganisms.

**Results:** The average age among the women was  $33.4 \pm 11.15$  years. The most frequent microorganism, *Gardnerella vaginalis*, was found in 16,137 examinations, followed by *Candida* spp. in *Trichomonas vaginalis* and the 12,661 in 2023. The use of oral contraceptives was found in 21,792 women, and these, showed the presence of *Gardnerella vaginalis* in 1054, *Candida* spp. and *Trichomonas vaginalis* in 687 in 133 tests. Regarding the use of use of copper intrauterine device, used by 18,894 women, the presence of *Gardnerella vaginalis* was detected in 964, *Candida* spp. and *Trichomonas vaginalis* in 595 in 122 of the cases.

**Conclusion:** The presence of microorganisms associated with contraceptive use is evident, in particular, *Garnerella vaginalis* which is more common in both kinds of contraception methods adopted by women.

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## Keywords

*Gardnerella Vaginalis*;  
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Abnormal Vaginal Flora;  
Vaginal Smears.

## Introduction

The normal vaginal microbiota, its interaction with the products of microbial metabolism, hormonal status and host immune response, are factors that promote the balance in the vaginal ecosystem [1]. The presence of women with genital tract infection caused by *Gardnerella vaginalis*, *Candida* spp. or *Trichomonas vaginalis* is frequent in gynecological medical offices and public health services [2, 3].

In this context, it is observed that bacterial vaginosis affects 30% of women in childbearing age, with asymptomatic prevalence and is associated mainly to the presence of *Gardnerella vaginalis* [4]. Vaginal candidiasis is developed when there is excessive proliferation of *Candida* spp. and it may be present even in acidic vaginal pH [5]. Trichomoniasis is considered a sexually transmitted disease, asymptomatic for most men, in contrast to what occurs with women, whose etiologic agent is the protozoan *Trichomonas vaginalis* [2].

The presence of these microorganisms in the vagina may be predominantly asymptomatic. Nevertheless, when symptoms are present, they can range from mild discomfort to severe complications such as infertility, spontaneous abortion, premature labor, pelvic inflammatory disease and pelvic endometritis [6, 7]. The use of the copper intrauterine device, spermicides, intercourse frequency and the habit of using vaginal douches are considered risk factors for these infections. However, the use of barrier methods or oral contraceptives is protective against such illnesses [8].

There is no agreement for the most appropriate contraceptive method for women who have recurring infections in the genital tract [9]. Despite the problem, there are very few studies on the relationship between the use of contraceptives and the presence of infectious agents.

Although the Pap smear has been designed for recognition epithelial changes in the neoplastic or pre-neoplastic nature of the cervix, through it, one

may suggest the presence of certain microbiological agents such as *Gardnerella vaginalis*, *Candida* spp. and *Trichomonas vaginalis* [7, 10]. This technique is a valuable diagnostic tool, especially in places where technological resources are limited [11].

Thus, the possibility of severe complications among women colonized increases the importance of studies to identify the age group most likely to develop bacterial vaginosis, candidiasis and trichomoniasis, as well as to determine the most appropriate contraceptive method.

Prevalence studies can be an alternative to check for possible risk factors. This information may be used in the planning of assistance policies to women's health and hence, measures of prevention and treatment become more effective by reducing the proliferation of resistant microorganisms. The purpose of this study was to determine the frequency of *Candida* spp., *Trichomonas vaginalis* and *Gardnerella vaginalis* in Pap tests and the presence of the copper intrauterine device or oral contraceptive.

## Method

This is a descriptive, cross-sectional study, using secondary data. We analyzed the information contained in preventive screening of the cervix smear collection, which took place in establishments that provide service to the public health system, the women's health attention program in the city of Aracaju, Northeast Brazil. With the performance of 133 family health teams, the city of Aracaju, is a reference in health services for other counties of the region and it has 43 institutions of primary health care, which have performed the Pap smear.

A number of 119,312 pap smears tests collected from January 2006 to December 2010 whose data were collected from the Database Information System for cervical cancer (SISCOLO), under the responsibility of the Municipal Health Department of that city, were analyzed. This system is designed

to store the identification of women, demographic and epidemiological information, in addition to the results of cytopathology and histopathology tests performed by the Public Health System in Brazil.

All the information has been transferred, categorized and analyzed in computer database software program SPSS (Statistical Package for the Social Sciences) version 18.0, and presented in the form of tables, using the chi-square test to check for the level of significance between groups. The significance level of 5% was considered to the whole study.

The variables analyzed in this study were: frequency of *Candida* spp. *Gardnerella vaginalis* and *Trichomonas vaginalis*, the use of pills or the intrauterine device, average age of patients and type of contraception method associated with the presence of microorganisms.

This study was approved by the Ethics Committee in Research of the Federal University of Sergipe under no-CAAE 1292.0.000.107-11.

## Results

*Gardnerella vaginalis* was the most common organism in all years investigated with 16,137 (13.52%) women affected, followed by *Candida* spp. with 12,661 (10.61%) and finally 2,023 with *Trichomonas vaginalis* (1.7%). The mixed infection caused by *Candida* spp. with *Gardnerella vaginalis* was identified in 504 cases with *Trichomonas vaginalis Gardnerella vaginalis* in 172 cases, *Candida* spp. associated with *Trichomonas vaginalis* was identified in 52 cases and *Candida* spp. *Gardnerella vaginalis* associated with the presence of *Trichomonas vaginalis* in 07 cases,

### Table 1.

It was observed that 21,792 women reported using oral contraceptive, and among these ones, there was the presence of *Gardnerella vaginalis* in 1054 women, *Candida* spp. in 687 cases and 133 *Trichomonas vaginalis*. Regarding the use of copper intrauterine device, 18,894 women have it as a contraception method and there was no record of the presence of *Gardnerella vaginalis* in 964, *Candida* spp. and *Trichomonas vaginalis* in 595 in

**Table 1.** Occurrence of microorganisms in pap smears. Information System Cervical Cancer: SISCOLO, Sergipe, 2006-2010.

Variables	2006	%	2007	%	2008	%	2009	%	2010	%	Total	%	p-valor*
Total number of exams	16550	-	27292	-	23983	-	27138	-	24349	-	119312	-	
<i>Gardnerella Vaginalis</i>	2010	12.15	4162	15.25	2803	11.69	3402	12.54	3708	15.23	16137	13.52	0.001
<i>Candida Spp.</i>	1705	10.3	3237	11.86	2061	8.59	2622	9.66	2996	12.3	12661	10.61	
<i>Trichomonas Vaginalis</i>	385	2.33	517	1.89	405	1.69	392	1.44	317	1.3	2023	1.7	
<i>Gardnerella Vaginalis/ Candida Spp.</i>	74	0.45	129	0.47	75	0.31	110	0.41	114	0.47	504	0.42	0.156
<i>Gardnerella Vaginalis/ Trichomonas Vaginalis</i>	35	0.21	54	0.2	33	0.14	28	0.1	21	0.09	172	0.14	0.351
<i>Candida Spp./Trichomonas Vaginalis</i>	8	0.05	11	0.04	13	0.05	10	0.04	10	0.04	52	0.04	0.655
<i>Gardnerella Vaginalis/ Candida Spp./ Trichomonas Vaginalis</i>	2	0.01	2	0.01	3	0.01	0	0	0	0	7	0.01	0.418

\*: Chi-square  $p \leq 0.05$

**Table 2.** Use of pill or IUD associated with the presence of microorganisms. Information System Cervical Cancer (SISCOLO), Sergipe, 2006-2010.

Variable	Microrganisms	2006	p-value*	2007	p-value*	2008	p-value*	2009	p-value*	2010	p-value*
IUD	Gardnerella	131	0.01	288	0.01	247	0.01	259	0.01	39	0.02
	Candida Spp.	62	0.01	187	0.01	139	0.19	187	0.01	20	0.01
	Trichomonas	11	0.83	37	0.06	35	0.46	35	0.6	4	0.52
PILL	Gardnerella	136	0.45	310	0.27	257	1.3	274	0.01	77	0.05
	Candida Spp.	74	0.01	210	0.33	150	0.56	204	0.08	49	0.04
	Trichomonas	17	0.67	37	0.01*	35	0.62	39	0.31	5	0.59

\*: Chi-square  $p \leq 0.05$

122, **Table 2.** The average age among women who had some kind of microrganisms considered potential infectious agent was  $33.4 \pm 11.15$  years.

## Discussion

Although the Pap test is not designed to diagnose the presence of microorganisms, its use for this purpose until the present day is a routine and remains controversial [12, 13]. When comparing its performance to that end, encouraging results are found in the diagnosis of *Gardnerella vaginalis* [10, 14].

The present study found the presence of *Gardnerella vaginalis* in pap smears in the years 2006, 2007, 2008, 2009 and 2010 with 12.15%, 15.25%, 11.69%, 12.54% and 15.23%, followed by the yeast *Candida* spp. with 10.30%, 11.86%, 8.59%, 9.66% and 12.30%, finally showing *Trichomonas vaginalis* 2.33% 1.89% 1.69% 1.44 % and 1.30% respectively for each year. These findings support those found in several regions of Brazil where *Gardnerella vaginalis* is the most pathogenic microorganism present in the female genital tract, compared with *Candida* spp. which was the second, followed by *Trichomonas vaginalis* through this technique [7, 15-17].

The infection caused by *Gardnerella vaginalis* is considered by some authors to be of sexual transmission [18], although this hypothesis is refuted by its presence in virgins school girls [8]. This type of

disease has been associated with lack of proper sexual orientation, education, hygiene habits, early onset of sexual activity and multiple partners [2, 8-10]. On the other hand, the disequilibrium in the vaginal ecosystem, due to the rise in pH above 4.5 and a decrease or absence of colonization by lactobacilli, decrease of vitamin A, folate and calcium may be predisposing factors to the proliferation of microorganism [6, 8, 19].

Like *Gardnerella vaginalis*, the presence of *Trichomonas vaginalis* can also be verified in Pap smear tests [20]. Its infection is considered a sexually transmitted disease, which risk factors are the number of sexual partners, socioeconomic status, personal hygiene, not using condoms and their association with other sexually transmitted diseases [21]. In pregnant women it can cause premature rupture of membranes and premature labor [7].

The colonization by *Candida* spp. is not generally well detected in Pap tests, due to its lower sensitivity when compared to the liquid medium [20, 22, 23]. In addition, the detection of *Candida* spp. in smear Pap tests is more difficult when the abnormal bacterial flora is also present or not when it comes to *Candida albicans*, which often do not make the pseudo-hyphae easily detected [9].

The so-called mixed infection in which there is presence of two or more potentially pathogenic microorganisms was detected in 735 tests. with a prevalence of the association between *Gardnerella*

*vaginallis* and *Candida* spp., followed by *Gardnerella vaginalis* associated with *Trichomonas vaginalis*. One hypothesis for this finding may be related to a vaginal pH which is friendly to this type of colonizing [7].

The contraceptive use was identified in only 34.1% of all analyzed tests (n = 119,312). The pill was the most reported with 18.2%, followed by copper intrauterine device with 15.8%. In other tests the type of contraceptive method was not identified. This lack of information is an obstacle to epidemiological studies aimed at using data from the Information System Cancer of the cervix (SISCOLO). Even with this difficulty, the data stored in this system represent an important resource for epidemiological studies, allowing the reduction of costs and time spent on research [24].

The use of the pill as the contraceptive method most commonly reported among women, reinforce studies [6, 16], which proves to be one of the most widely used, especially in northeast of Brazil. Research [25] on women's health in Brazil, showed that this type of contraception is one of the two most used methods.

Regarding the presence of microorganisms associated with the studied contraceptive use, the findings corroborate studies [26, 27] on the use of the pill and increased protection of women against any type of vaginal infection. However, the presence of copper intrauterine device is typically a promoter factor for bacterial [6, 28].

The average age of women who had some type of microorganisms was  $33.4 \pm 11.1$  years, and this finding is similar to studies [29, 30] that highlight the second to fifth decades of life such as higher incidences for opportunistic infections of the vagina. In this study, the high standard deviation is justified by the large number of young people who underwent pap smear.

It was concluded that the greater frequency of *Gardnerella vaginalis*, followed by the presence of *Candida* spp. and *Trichomonas vaginalis*, denote

the occurrence of mixed infections with evidence of three potentially pathogenic microorganisms. Regarding the use of contraceptives, the oral type is more used when compared with the copper intrauterine device. In the presence of microorganisms associated with the use of contraception, there is a greater frequency of *Gardnerella vaginalis* in both types of contraception methods used by women. Note also that after ten years of implementation of SISCOLO, there are still many missing data, which hinders epidemiological studies, related to women's health to facilitate the most appropriate contraceptive gynecologists can state in order to prevent opportunistic infections.

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