

# Prevalence of Vulvovaginitis in Pregnant People in a Health Center in San Juan Cancuc, Chiapas, México

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To quote this article:

López Vázquez, M., Rodríguez Feliciano, M. Ángel, García Chong, N. R., & de la Cruz Estrada, M. del S. Prevalencia de Cervicovaginitis en Gestantes en un Centro de Salud de San Juan Cancuc, Chiapas, México. *Espacio I+D, Innovación más Desarrollo*, 13(37). <https://doi.org/10.31644/IMASD.37.2024.a02>

— Abstract —

Infectious vulvo vaginitis is a pathology that affects women worldwide. First-level health centers report that there is a high rate of women of child-bearing age who came for consultation during pregnancy due to alterations in the vaginal microbiota, causing asymptomatic/symptomatic infectious vulvovaginitis. In Mexico, infectious vulvovaginitis is one of the ten main reasons for consultation, which frequently occurs between 20 and 45 years of age, and 30% of gynecological consultations are due to vaginal infections. To determine the prevalence of infectious vulvovaginitis in pregnant women between 18 and 40 years of age, who attended prenatal care for the first time at the Health Center with Expanded Services (CESSA), in San Juan Cancuc, in the Chixtetic, Cancuc Abajo, and Choj Chow. Identifying the main etiological agent and the risk factors, the age group, and the number of pregnancies in which infectious vulvovaginitis was most common. An observational, descriptive-explanatory, cross-sectional, and prospective study was carried out. All pregnant women between 18 and 40 years old who attended prenatal care for the first time and belonged to the aforementioned neighborhoods, within the established period, were entered into the study. A clinical history, physical examination, routine admission studies, fresh smears, Gram stain, and cervicovaginal culture on blood agar were performed. A prevalence of infectious vulvovaginitis of 47% was found; 25% corresponded to *Candida albicans* (common in the age group 22-25 years), 14% to *Gardnerella vaginalis*, and 8% to *Trichomonas vaginalis*. The predisposing factors were: multiple sexual partners and lack of condom use. It is concluded that the prevalence of vulvovaginitis is moderate compared to other countries.

**Keywords:**

*Cervical-vaginal infection; pregnancy; indigenous population.*

Infectious vulvovaginitis is defined as inflammation of the vaginal mucosa, the cause of which is usually due to infections by fungi (*Candida*), bacteria (*Chlamydia trachomatis*), and protozoa (*Trichomonas vaginalis*) (CENETEC, 2014). Its prevalence is high, although the figures vary according to the sources, finding notable differences between geographical areas and ethnicities (SEGO, 2022).

In Mexico, the actual prevalence of infectious cervicovaginitis is unknown. The existence of asymptomatic cases is estimated at 15 to 19% in women of childbearing age; however, the percentage increases during pregnancy (Trejo, 2003). Of the multiple infectious pathologies that occur in the cervicovaginal canal, infectious vulvovaginitis is the most prevalent. Sexually Transmitted Infections (STIs) rank second in the overall morbidity of women between the ages of 15 and 44. According to Domingo (2019), the World Health Organization (WHO) reported in 2016 that more than 1 million people (pregnant and non-pregnant) contract at least one STI every day, which increases concern about the number of premature births and changes in the newborn.

Vulvovaginitis is common in pregnancy due to hormonal changes in the vaginal tract, causing a homeostatic imbalance of the vaginal microbiota. Asymptomatic cases are due to microorganisms such as *Candida albicans* or *Gardnerella vaginalis* that can remain in low concentrations as normal microbiota. These infections affect the fetal-placental junction, leading to maternal-fetal and newborn complications. With the determination of the etiological agent of asymptomatic evolution, first-level doctors give specific treatment and hygienic indications to combat the disease and avoid the risk of recurrence. Vulvovaginitis caused by *Candida* occurs between 20 and 25% of pregnancies and for bacterial vaginosis (BV) between 14 and 21% but, *Candida albicans* is the most frequent etiologic agent of infectious vulvovaginitis in pregnancy globally. The gold standard test to establish the diagnosis is endocervical culture (Roura, 2012).

Several risk factors are associated with the acquisition of sexually transmitted diseases, including biological and behavioral factors, cultural influences, lack of information on STD transmission and contraction, difficulty accessing prevention services, and number of sexual partners (Cohen, 2002, as cited in Fabiani, 2018).

In Indigenous communities, there are disadvantages that women experience concerning their well-being (deficiency or lack of respect for human rights, interculturality, and gender equality). The intercultural approach promotes and considers health as a fundamental right, so health professionals must be able to integrate scientific knowledge with traditional beliefs and practices in the management and treatment of the disease. The WHO (2018) mentions that health equity and the differences that exist in the state

of Chiapas are not the result of biological differences but rather, of social and economic processes; observing that there is little or no prevention in reproductive health.

Young indigenous language speakers show earlier entry into reproductive life, compared to young non-speakers. Some of the transformations in the transition from childhood to adulthood are related to sexuality and the beginning of reproductive life. Half of women in Chiapas use their first contraceptive method five years after the first sexual intercourse. There are multiple reasons for omitting the use of contraception in the first sexual intercourse such as the desire to conceive, not knowing contraceptive methods, not planning to have sex, not believing that they can get pregnant, and being uneducated women who did not use contraceptive methods due to ignorance. These figures increase the Global Fertility Rate and the risk of contracting an STI (SGCONAPO, 2021).

Thus, worldwide several factors predispose to the acquisition of vaginal infections in pregnant women: multiple sexual partners, promiscuity, practice of unprotected sex, douching, use of corticosteroids, Human Immunodeficiency Virus (HIV) infection, and diabetes mellitus, among others.

According to the Federal Ministry of Health (SSA, 2018), in Mexico, approximately 30% of gynecological consultations are due to vaginal infections, usually occurring between the ages of 20 and 45. Pregnancy in Chiapas, especially in indigenous communities, is considered a desired event and a sign of good health. In pregnancy, there are numerous reactions that the fetus and the excess of pregnancy hormones cause morphological, physiological, metabolic, respiratory, gastrointestinal, renal, urinary, cardiovascular, immunological, and psychological changes in the mother.

The immunological role plays an important role during pregnancy, as there is immunosuppression to prevent rejection of the embryo or fetus. This effect of immunosuppression in the female reproductive system causes a decrease in the vaginal hydrogen potential (pH) due to the increase in the secretion of nutrients and the increase in the concentration of lactobacilli (Mora, 2019).

Lactobacilli are part of the normal vaginal microbiota, protecting against infection through several mechanisms. Hormonal changes occur in the physiological process of pregnancy that alter the vaginal microbiota, making cervicovaginal infections frequent during pregnancy. Vulvovaginitis is the main cause of consultation in the first and second levels of health care. Ignorance of the magnitude of the prevalence of vulvovaginitis in a community leads to it being underestimated in the first-level consultation. On the other hand, their importance lies in the fact that they are mostly asymptomatic, which makes early intervention difficult, both for preventive purposes and

in timely treatment, becoming a factor for obstetric complications and often difficult to eradicate with a risk of recurrence (Mora, 2019).

The clinical practice guideline (CENETEC, 2014) states that vulvovaginitis is inflammation of the vaginal mucosa, caused by various etiological agents, such as fungi (*Candida*), bacteria (*Chlamydia trachomatis*), or protozoa (*Trichomonas vaginalis*) (Figure 1). Which are manifested by vaginal discharge or abnormal leukorrhea. In any of the entities, the medical history must be carried out with emphasis on sexual history (number of partners and use of condoms), any woman with a history of persistent abnormal vaginal discharge must be clinically examined (gynecological examination), and in the presence of abnormal vaginal discharge, it must be ruled out that it is secondary to the use or presence of foreign bodies (tampons and retained condoms). For bacterial vaginosis, there are certain diagnostic criteria, Amsel (abundant homogeneous transvaginal flow, grayish-white, small bubbles, fishy odor, and adherent to the cervix and vaginal walls), as well as the Hay-Ison criteria for cervical vaginal exudate smears (Vázquez, 2019; CENETEC, 2014).

The Spanish Society of Gynecology and Obstetrics reports that the main causes of consultation in health care units are genital infections in both primary, specialized, and emergency care consultations: representing 20% of total consultations; in the black American population it is 45% to 55% and in Asian women, it is reported between 20% and 30% (SEGO, 2022).

The WHO (2020) reported that more than 340 million cases of sexually transmitted infections occur every year. The highest rates of STIs are reported between the ages of 20 and 24, followed by the ages of 15 and 19, with 28% being positive for a sexually transmitted infection. In the United States, these infections account for approximately 10 million consultations annually (Sahagún, 2015). In Mexico, they are part of the top 10 reasons for consultation in the Gynecology and Obstetrics service as well as one of the top 20 diagnoses in the first level of care. The Ministry of Health (SSA, 2018) reports that they occur frequently between the ages of 20 and 45, representing 30% of gynecological consultations, due to vaginal infections, indicating that the women most likely to have this type of infection are women who are pregnant, with diabetes, under chemotherapy treatment, climacteric, and teenagers. In pregnant women, vulvovaginitis can lead to premature births, membrane rupture, infections in infants, and death (SSA, 2018).

This leads to reviewing the number of pregnancies and the risk of infectious vulvovaginitis. In this sense, in Mexico, the Global Fertility Rate in Chiapas in 2014 was 2.89 (the national rate was 2.21); while the Adolescent Fertility Rate was 93.25 (the national 77.04) (SGCONAPO, 2021). According to the National Demographic Dynamics Survey 2018 (INEGI, 2020), the Global Fertility Rate (GFR) from 2015 to 2017 was 2.07 live births for each

woman aged 15 to 49 years. It is estimated that in Mexico there are 22.2 million women between the ages of 15 and 49 who have been pregnant at least once during their lives.

In this order of ideas, Mexico ranks first in adolescent pregnancy, with a fertility rate of 77 births per thousand teenagers from 15 to 19 years of age, where 23% of teenagers begin their sexual life between 12 and 19 years of age; observing that 15% of men and 33% of women did not use any contraceptive method in their first sexual intercourse, so the risk of acquiring an STI is increased; in this way, 340 thousand births occur per year in women under 19 years of age (ENPEA, 2014).

The number of pregnancies in teenage women is higher in the states of Chiapas, Oaxaca, Guerrero, and Puebla according to ENADID (2014), with Chiapas being the state that ranks third in the number of pregnancies in children under 19 years of age; and ENADID (2018) places it as the state with the highest General Fertility Rate nationwide.

Chiapas is characterized by a demographic structure made up mostly of young people, being 34.7% of the total population of the state (INEGI 2010). In addition, it is the state with the second highest marginalization rate at the national level, with 88.7% according to the State Committee for Statistical and Geographic Information (CEIEG, 2020). The most recent update, according to CONAPO (2020), the Global Fertility Rate in 2020 was 2.69 and in the Mexican Republic 2.05.

In San Juan Cancuc, women, throughout their lives, between 15 and 19 years old have had on average 0.2 children born alive; while this average is 6.9 for women between 45 and 49 years old (INEGI, 2010). Half of the young people who speak an indigenous language had their firstborn at age 23, while non-indigenous young people did so at age 24. The former registered a global fertility rate (GFR) in 2010 of 2.5 children; and the non-indigenous ones of 2.6 children. This rate rises in non-urban women to 3.6 children and up to 4.2 children among Indigenous women (Vázquez-Sandrin, G. & Ortíz-Avila, E., 2020).

The use of contraceptive methods shows differences according to gender and ethnic status. According to the National Youth Survey (2010, cited in Ávila & Jáuregui, 2015), 48.1% have used some method in their first sexual relationship, with men being the ones who used it in the highest proportion (60.2%). By ethnicity, the proportion of young non-indigenous language speakers who used contraception is almost double that of indigenous language speakers (51.8% and 26.1% respectively). The condom is the most used method in the first sexual intercourse. Males used it 91.1%, while females used it 79.6%. The lowest percentage corresponded to Indigenous people, with 76.7% (Reardes, 2017).

Statistics on fertility, birth rate, demographic changes, and sexual and reproductive health, show the quality of reproductive life and sexuality of women, observing that the prevalence of vulvovaginitis increases as a result of poor or deficient prevention, and promotion of sexual health. In addition, the importance of primary care for the condition is consolidated, to provide adequate management for each type of vaginal infection and thus improve the reproductive quality of life of patients who suffer from it.

The scarce information on both at the national, state and local levels on the subject allowed the study to be approached to know the most frequent prevalence and etiological agent, as well as the age group most likely to develop infectious vulvovaginitis, as well as risk factors associated with vulvovaginitis in pregnant patients aged 18 to 40 who attended prenatal control for the first time at CESSA San Juan Cancuc, during the established time and place limit.

Infectious vulvovaginitis is a potential problem in pregnant women. Therefore, the purpose of this work is to know the prevalence of infectious vulvovaginitis in pregnant patients aged 18 to 40 who go for the first time to prenatal control at the Health Center with Expanded Services of San Juan Cancuc in the following neighborhoods: Chixtetic, Cancuc Abajo, and Choj Chow. Likewise, determine the main risk factors, group, most frequent age, and most common etiological agent, given that these infections are a public health problem. The actions that will be developed during the study will help prevent possible complications of pregnancy and the postpartum period, to reduce the incidence of maternal-fetal death. In addition, as a health unit, prioritize and implement vulvovaginitis prevention measures, encourage health promotion through educational talks, and increase the quality of life of women of childbearing age.

In Cuba, Martínez (2013) reported that in 1955 bacterial vaginosis was recognized as a nosological entity by the studies carried out by Gardner and Dukes, naming the disease as "Haemophilus vaginitis". The bacterium was thought to belong to the *Haemophilus* group; but due to the unique properties of the isolated bacterium, it was necessary to create a new genus: *Gardnerella*. Subsequently, they recognized that *Gardnerella vaginalis* is not exclusively the cause of the symptoms, since other microorganisms were discovered in the vaginal fluid, anaerobic species: *Bacteroides*, *Peptostreptococci*, *Mycoplasma* (*Mycoplasma hominis*), and *Mobiluncus*.

Rojas et al., (2016) conducted a study called "Vaginal infections in pregnant patients of a highly complex clinic in Medellín-Colombia" and found that, of 67 patients, there was a median age of 23 (IQR 21-29) years; 40% were pregnant for the first time, and 66% nulliparous. Only 15% of vaginal infections occurred in the first gestational trimester. The most frequent microbiological diagnosis was Vulvovaginal Candidiasis (41.4%), followed

by Bacterial Vaginosis (24.1%), concluding that vaginal infections constitute a pathology with frequent symptoms, which generally occurs in the second half of pregnancy, with *Candida* spp being the most common etiological agent (Toro, 2019).

Occhionero (2018), in the City of Bahía Blanca in Argentina, mentioned that vaginosis is the most prevalent pathology, finding that the highest prevalence corresponded to bacterial vaginosis (21,36%), then yeasts (13,90%), *T. vaginalis* (3,73 %) and *C. trachomatis* (3,05 %). The risk factors fall within the framework of values of the central-southern region of the country, but the significant frequency of alterations in vaginal function (68,87%) and chlamydial infection (4,35%) detected in asymptomatic women should be highlighted.

In Costa Rica, Sánchez (2018) pointed out that vulvovaginitis is inflammation of the vulva and vagina. The main etiologies are *Candida albicans*, *Gardenerella vaginalis*, and *Trichomonas*; a very common cause of consultation in primary care. Among them, trichomonas vulvovaginitis is a sexually transmitted infection that needs treatment for the patient and the couple. Vulvovaginitis does not provide complications, especially in pregnant women, its treatment depends on the etiology.

In Colombia, Gomez-Rodriguez (2019) calculated the prevalence of colonization period by some of the micro-biological agents and the specific one, finding that the global prevalence was 24,8% (56/226). Of these, 55,4% (31/56) were due to agents causing vaginitis, and 44,6% (25/56) were due to vaginosis. The specific prevalence by type of pathogens was: colonization by *Candida* spp. in 13,3% (30/226) and by *T. vaginalis* in 0,4 % (1/226). BV occurred in 8,0% (18/226), concluding that there is significant colonization of the lower genital tract of potentially pathogenic germs in pregnant women from 35 to 37 weeks.

In Venezuela, Maiellano (2020) mentioned that women's sexuality during pregnancy can present notable changes that often lead to unpleasant sexual relations. This generates negative effects on sexuality at this stage, causing modifications in the pattern of female sexual behavior, where a decrease in vaginal intercourse and other sexual practices is almost always observed in an unjustified way; concluding that in most cases there is less sexual activity due to the decrease in sexual desire, with alterations in the phases of the female sexual response and that these situations are influenced by external factors such as sociocultural ones.

On the other hand, it was observed that there may also be a positive effect on sexuality during pregnancy, especially in women with good sexual practices before pregnancy.

In Sao Paulo Brazil, Santos et al., (2023) found in a sample of 1.173 women that the prevalence of bacterial vaginosis was 31,8%. The degree of agreement between the two diagnostic methods by the Kappa index was



0,54, considered moderate, with a value  $<0,001$ . Sensitivity was 55,2% and specificity 94,1%, with an accuracy of 81,7%, a positive predictive value of 81,4%, and a negative predictive value of 81,8%. Vaginal smear, but can be used as an auxiliary method for the diagnosis of bacterial vaginosis.

Based on the above, and based on current knowledge of vulvovaginitis, the interest in asking the following question arose: *What is the prevalence of infectious vulvovaginitis in pregnant patients aged 18 to 40 who went for the first time to prenatal control at the Centro de Salud con Servicios Ampliados San Juan Cancuc, in the neighborhoods of Chixtetic, Cancuc Abajo and Choj Chow?*

Therefore, this research aimed to determine the prevalence of infectious vulvovaginitis, as well as establish which was the main etiological agent and identify what were the main factors associated with pregnant patients aged 18 to 40 who went for the first time to prenatal control at the Centro de Salud con Servicios Ampliados San Juan Cancuc in the neighborhoods of Chixtetic, Cancuc Abajo, and Choj Chow from January to November 2020.

## MATERIALS AND METHODS

This is an observational, descriptive-explanatory, cross-sectional, and prospective study, developed through interrogation, medical history, gynecological examination, and cervical-vaginal culture sampling in pregnant patients with suspected infectious vulvovaginitis, who went for the first time to prenatal control at the Centro de Salud con Servicios Ampliados (CESSA) in the municipality of San Juan Cancuc. The population of pregnant patients who participated in the study was 18 to 40 years of age, who went for the first time to prenatal control at the CESSA related to infectious vulvovaginitis, who participated in the study voluntarily and met the inclusion criteria.

The context of the study considered CESSA, specifically from the neighborhoods of Chixtetic, Cancuc Abajo, and Choj Chow, which together have a population of 1,249; where 606 belonged to the male gender and 643 to the female gender, taking from this group a total of 276 women in the reproductive stage, in an age range of 15 to 49 years of age as possible candidates for the study, from which 36 pregnant women were selected who went to prenatal control registered in the MIUS platform, as pregnant patients for the first time, who met the inclusion criteria.

The sample extracted from the population was for convenience in pregnant patients of San Juan Cancuc's CESSA between 18 and 40 years old, and went for the first time to prenatal control with infectious vulvovaginitis, from January to November 2020. Personal data of the volunteer patients were recorded in the Integrative Module of Health Units (MIUS) platform: file number, unique registration key, patient's full name, age, height, weight,

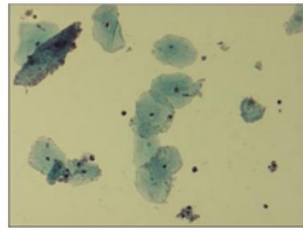
date of consultation, diagnoses, requested laboratories, last date of menstruation, probable date of delivery, capillary glycemia, body mass index, first consultation, origin, and reproductive health, in addition to personal hygiene.

The inclusion criteria were all pregnant patients aged 18 to 40 years who entered the MIUS platform with a proven diagnosis of infectious vulvovaginitis. In addition to belonging to any of the three neighborhoods: Chixtetic, Cancuc Abajo, and Choj Chow. Considering also those who entered prenatal control on the established dates, and who accepted the performance of cervicovaginal culture. The study considered the presence of pathogenic microorganisms and the control variables were age and origin. The exposure variables were sex, gestations, prenatal control, number of sexual partners, origin, intercourse during pregnancy, condom use, anal sex practice, genital grooming, grooming before and after sexual intercourse, intensity of vaginal discharge, and appearance of vaginal discharge. All patients who were authorized to participate underwent obstetric gynecological examination and sampling of endocervical secretion with three swabs for each study, performing fresh smears, Gram staining, and cervicovaginal culture on blood agar (from 24 to 48 hours up to 72 hours). Samples were taken independently of gestational age, and the microbiota present was identified using the techniques described above (Table 1 and Figure 1).

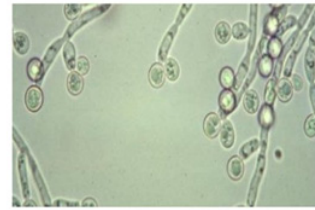
**Table 1**  
Differential diagnosis between infectious vulvovaginitis

	Vaginosis bacteriana (25-40%)	Vaginitis por Candida (20-25%)	Vaginitis por Tricomona (15-20%)	Chlamydia Trachomatis (<15%)
<b>Etiología</b>	Bacterias ( <i>Gardnerella vaginalis</i> (40-50%), <i>Mycoplasma hominis</i> , <i>Ureaplasma urealyticum</i> , <i>Prevotella</i> , <i>Bacteroides</i> , <i>Mobiluncus</i> , <i>Atopobium species</i> ).	Levadurahongo: <i>Candida albicans</i> (80-90%), <i>Candida glabrata</i> , <i>Candida tropicalis</i> y <i>Candida krusei</i> .	Protozoario flagelado anaeróbico: <i>Trichomonas vaginalis</i> , <i>Trichomonas tenax</i> y <i>Trichomonas hominis</i> .	Es un microorganismo intracelular obligado, Gram negativo.
<b>Factores de riesgo</b>	Duchas vaginales, cunnilingus receptivo. Raza negra, nueva pareja sexual, tabaquismo, anticonceptivos orales, ITS, DIU, obesidad, pérdida de lactobacilos por cualquier causa.	Diabetes descontrolada, anticonceptivos orales, uso de diafragma con espermicida, obesidad, uso de antibióticos y corticoides, quimioterapia, embarazo, ropa ajustada, alergia local a perfumes y jabones.	Múltiples parejas sexuales	Múltiples parejas sexuales.
<b>Cuadro clínico</b>	Leucorrea fluida blanca o grisácea fétida y olor a pescado, sin dolor. (50%-70%) son asintomáticas).	Inflamación vulvovaginal, fisuras, secreción blanquecina adherente a la mucosa con grumos (queso cottage, requesón o yogur), disuria postmiccional, dispareunia, ardor vulvar, eritema vaginal y no hay fetidez. (20% son asintomáticas)	Leucorrea amarilla-verdosa abundante espumosa, gaseosa, fétida, disuria, dolor pélvico bajo, vulvitis, vaginitis (edema, eritema, cervicitis), cuello uterino en fresa (colpitis en fresa). (50% asintomáticas).	Leucorrea amarillenta, molestia rectal y fetidez, disuria, cuello cervicouterino inflamado, edematoso, eritematoso y friable, dolor el hipogastrio, prurito y escozor vaginal durante el coito. (50% son asintomáticas).
<b>pH vaginal</b>	> 4.5	< 4.5	> 4.5	> 4.5
<b>Pruebas diagnósticas</b>	Estudio microscópico del frotis (Gram o citológico cervicovaginal o Papanicolaou), medición de pH vaginal, KOH al 10%, cultivo.	Frotis en fresco con suero fisiológico al 0.9%, tinción de Gram y estudio citológico cervicovaginal, cultivo.	Frotis convencional de Papanicolaou, microscopía, cultivo para <i>Trichomonas</i> , prueba de ácido nucleico, prueba rápida de antígeno o sonda de ADN y KOH 10%.	Cultivo endocervical
<b>Microscopía</b>	Células clave, leucocitos escasos, <i>Lactobacillus spp.</i> , flora mixta abundante	Leucocitos, células epiteliales, levaduras y pseudomicelios (80%).	Leucocitos T	
<b>Complicaciones</b>	Abortos, ruptura prematura de membranas, endometritis, coriamnionitis, infecciones postparto e infección del tracto urinario.	Ruptura prematura de membranas y parto prematuro.	Parto prematuro y bajo peso al nacer. Aumenta el riesgo de contraer una ITS.	Embarazo ectópico, enfermedad pélvica inflamatoria, infertilidad y ruptura prematura de membrana.
<b>Tratamiento</b>	Metronidazol 400-500 mg VO cada 12 horas por 5-7 días.  Metronidazol 2 g VO DU.  Metronidazol local vaginal por 5 días.  Tinidazol 2 g VO cada 24 horas por 2 días o 1 g VO por 5 días.  Clindamicina 300 mg VO por 7 días o local vaginal 2% por 3 días.	Clotrimazol crema vaginal cada 24 horas por 14 días.  Nistatina 100,000 UI óvulo vaginal cada 24 horas por 14 días.	Metronidazol 500 mg VO cada 12 horas por 7 días.  Metronidazol 2 g VO DU  Tinidazol 2 g VO DU en casos resistentes o Metronidazol 2 g VO cada 24 horas por 7 días.	Azitromicina 1 g VO DU.  Alternativo: Eritromicina 500 mg cada 6 horas por 7 días.  Ofloxacina 300 mg cada 12 horas por 7 días.

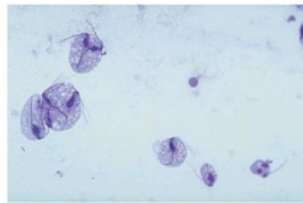
Note. (CENETEC, 2014), (Vázquez, 2019), (Roura, 2012), (Carretero, 2009), (Murray, 2017), (Nau, 2019).



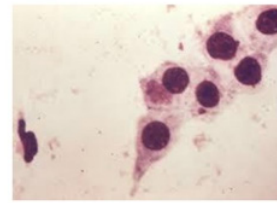
**Gardnerella Vaginalis (CDC, 2020)**



**Candida albicans (INSST, 2020)**



**Trichomona vaginalis (Avantor, 2022)**



**Chlamydia Trachomatis (CDC, 2020)**

Figure 1. Microscopic view of microorganisms causing infectious vulvovaginitis during pregnancy

The samples that were obtained were sent to the CESSA laboratory. Subsequently, the results of the cervicovaginal culture were announced to the patients included in the study at their second appointment to start treatment. The rest of the information was obtained through gynecological-obstetric medical history direct interrogation and the MIUS platform. The data obtained were handled with absolute and relative values.

With the results and patient data, a database was built and subsequently analyzed using the SPSS statistical package. For the statistical analysis, a descriptive statistic of the variables was carried out in the first phase; and in the second phase, inferential statistics tests were carried out, through association tests with the Chi-square test statistic, comparing the etiological agents with the age groups.

## RESULTS

Thirty-six pregnant patients aged 18 to 40 years from the Chixtetic, Cancuc Abajo, and Choj Chow neighborhoods of San Juan Cancuc's CESSA were studied, who attended prenatal control for the first time and authorized entry into the study. As illustrated in Table 4, the age distribution of the 36 patients was as follows: the most frequent age group was 18 to 21 years with 28% while the age groups from 30 to 33 and 38 to 40 years were the least frequent, both with 8% each.

**Table 2**  
The age group who entered prenatal control

Age Group	Patients	%
18-21	10	28
22-25	9	25
26-29	7	20
30-33	3	8
34-37	4	11
38-40	3	8
Total	36	100

Note. Own elaboration according to registration sheet and MIUS platform, 2020.

Of the sample of 36 patients studied, 17 (47%) were positive for microorganisms and 19 (53%) were found to have normal vaginal flora.

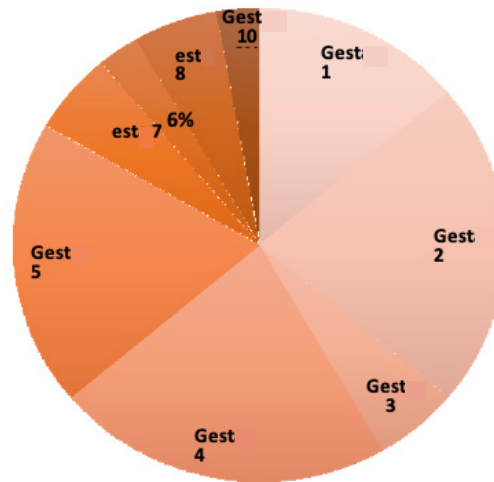
The most common etiologic agent was *Candida albicans* with 9 positive cases, regardless of age group, corresponding to 25%, followed by *Gardnerella vaginalis* with 5 positive cases, regardless of age group with a percentage of 14%. *Trichomonas vaginalis* was the microorganism less frequent, with 3 cases corresponding to 8%, while no cases were found for *Chlamydia trachomatis*. Regarding *Gardnerella vaginalis*, no statistically significant association was found concerning the age groups ( $p=0.78$ ). However, there is a trend towards the 18 to 21 and 22 to 25 age groups. In the case of *Candida albicans*, no statistically significant association was found concerning the age groups ( $p=0.89$ ), concerning the rest of the microorganisms, with a higher prevalence observed in the 22 to 25 age group. *Trichomonas vaginalis* was the least frequent microorganism, and no statistically significant association was found concerning the age groups ( $p=0.49$ ). However, three positive cases were found within a wide range ranging from 22 to 33 years. Regarding *Chlamydia trachomatis*, no statistically significant association was observed, since no positive cases were found (see Table 3).

**Table 3**  
Relationship between age group and microorganism

Age Groups	Type of microorganism															
	<i>G. vaginalis</i>				<i>C. albicans</i>				<i>T. vaginalis</i>				<i>C. trachomatis</i>			
	Pos	%	Neg	%	Pos	%	Neg	%	Pos	%	Neg	%	Pos	%	Neg	%
18 a 21	2	6	8	22	2	5	8	22	0	0	10	28	0	0	10	18
22 a 25	2	6	7	20	3	9	6	17	1	3	8	22	0	0	9	25
26 a 29	1	2	6	17	2	5	5	14	1	3	6	17	0	0	7	20
30 a 33	0	0	3	8	1	3	2	6	1	3	2	5	0	0	3	8
34 a 37	0	0	4	11	1	3	3	8	0	0	4	11	0	0	4	11
38 a 40	0	0	3	8	0	0	3	8	0	0	3	8	0	0	3	8
Subtotal	5	14	31	86	9	25	27	75	3	9	33	91	0	0	36	90
Percentage		14		86		25		75		9		92		0		
gI		5				5				5				0		
X2		2.44				1.6				4.41				0		
p		0.78				0.89				0.49				0		

Note. Own elaboration according to laboratory results, 2020.

The most frequent number of pregnancies (gestations) presented by the patients who entered the study was between 2 and 4 (Figure 2). Regarding the number of gestations and microorganisms studied, patients with five gestations presented vulvovaginitis more frequently (14%), followed by those with 4 gestations (11%), continuing with the first, second, and third gestations with 6 (see Table 4). No evidence was found on the number of gestations as an associated factor for infectious vulvovaginitis.



Note. Own elaboration according to registration sheet and MIUS platform, 2020.

Figure 2. Gestation Count

**Table 4**  
*Number of gestures and microorganism ratio*

Gestation	Type of microorganism				Casos positivos	%	Casos negativos	%
	G. vaginalis	C. albicans	T. vaginalis	C. trachomatis				
1	0	2	0	0	2	6	3	8
2	1	1	0	0	2	6	6	17
3	2	0	0	0	2	6	0	0
4	0	3	1	0	4	11	4	11
5	2	2	1	0	5	14	2	5
6	0	0	1	0	1	2	1	3
7	0	0	0	0	0	0	1	3
8	0	1	0	0	1	2	1	3
9	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	1	3
Subtotal	5	9	3	0	17		19	
Percentage	14	25	9	0	47	47		53
Total	36							

Three patients mentioned having had 2 sexual partners since the beginning of their active sexual life (IVSA), aged 23, 19, and 20 years, being positive for *Trichomonas vaginalis*, *Gardnerella vaginalis*, and *Candida albicans*, respectively (see Table 7).

**Table 5**  
Prevalence of vulvovaginitis in relation to sex life factors

Factors	POSITIVE AMOUNT	%	AGE	MICROORGANISM
Multiple sex partners	3	8.3	23	<i>Triconomas Vaginalis</i>
			19	<i>Gardenella Vaginalis</i>
			20	<i>Candida Albicans</i>
Intercourse during pregnancy	34	94.3		

Note. Own elaboration based on medical records and MIUS platform, 2020.

## DISCUSSION

The prevalence of infectious vulvovaginitis found was moderate with 47% of positive cases, which is consistent with studies such as SEGO (2022), which found a prevalence of between 45% to 55%, these prevalences are the result of socioeconomic and cultural processes, coupled with the fact that health personnel in these communities lack more training and in the workplace, there is a shortage of supplies to treat this type of disease. Hence the importance of this type of study, which allows monitoring of the needs that exist to provide better care and improve the salutogenesis of these communities.

Regarding the prevalence of microorganisms, it was found that the main pathogens were: *Candida Albicans* at 25% *Gardnerella vaginalis* at 14%, and 8% *Trichomonas vaginalis*, behavior similar to that reported by Espitia (2021), which found a higher prevalence for *Candida albicans* with 60.3% followed by *Gardnerella vaginalis* with 19.5% and later by *Trichomonas vaginalis* with 0.8% to 3.2%. However, it differs from a study by Gomez-Rodriguez et al., (2019), in which the pathogens found were 0.4% for *Trichomonas vaginalis* and 13.3% for *Candida Albicans*, in support of the results found, Sanchez (2018) mentioned that the main etiologies of vulvovaginitis are: *Candida albicans*, *Gardnerella vaginalis* and *Trichomonas*, the latter being sexually transmitted that requires treatment for the patient and her partner. This shows the limitations that the health sector has in these communities to more effectively address these types of problems, which are mainly due to the lack of resources and training and can be improved with an adequate primary health care program.

Based on age groups, the prevalence of infectious vulvovaginitis was higher in the age group of 22 to 25 years, with no relationship to the etiologic agent. This coincides with that reported by García (2019), where he mentions that he found a prevalence of 17 to 26 years independent of the etiological agent causing salutogenesis, which agrees with the age ranges mentioned by other authors.



On the other hand, Rosada et al., (2019) found that the predominant vaginal infections at the secondary and pre-university education level occurred in children under 19 years old, followed by the group of 20 to 25 year olds. Similarly, Sánchez (2022) reported that vaginal infections affect the age group of 20 to 24 years.

One of the ways to explain the results of this study is what was proposed by Felipe (2019) and Domingo (2019). They suggest that the prevalence in this age group is due to several factors, such as the early onset of active sexual life, and relationships with multiple sexual partners, in addition to the fact that vulvovaginitis is closely related to the lack of condom use and, therefore, there is a high probability of unwanted pregnancies, which triggers hormonal fluctuations that make it more likely to suffer from some type of vulvovaginitis. Although there are currently economic limitations to being able to serve this group of the affected population, a good prevention program can help reduce these rates, within a primary health care program on sex education.

On the other hand, a higher incidence of infectious vulvovaginitis was found in women who have had more than one pregnancy, specifically those who have had 5, with 14% drastically decreasing the prevalence of infectious vulvovaginitis from the fifth pregnancy, this can be explained by the reduction in sexual activity (see Table 7), a result that differs from the study by Zaráte (2011). He mentioned that in first-time pregnant women, the incidence is more frequent, justified by the first sexual experience and by the lack of knowledge in hygiene techniques or the non-use of condoms. In the words of Maiellano (2020), women's sexuality during pregnancy shows notable changes, and in most cases, there is a decrease in this activity.

In addition, internal predisposing factors for infectious vulvovaginitis were sought using different data collection instruments, which were performed at the time of admission to prenatal control of the patients who were authorized to participate in the study. No statistical significance was found in the variables studied. However, it is important to note that 3 patients reported having had 2 sexual partners since the beginning of their active sexual life, positive for at least one type of etiological agent. In this sense, a study by Fabiani (2018) reported that multiple sexual partners increase the risk of suffering from some type of vulvovaginitis. What was relevant in this study was that 34 patients had sex during pregnancy, and both patients and their spouses denied the use of condoms. They were also asked about personal hygiene, so they certainly responded to the correct cleaning technique. Much of the problem can be addressed and solved with a good sex education program, which helps prevent these types of infections.

One of the main contributions of this work is to be able to know the conditions that women in this population have regarding sexually transmitted

infections. However, the type of community and the characteristics of the diagnostic tests made it difficult to have a larger sample size that would allow us to have a better inference.

## CONCLUSIONS

The prevalence of infectious vulvovaginitis was moderate within the parameters referred by other countries. The most frequent age group with the most infectious vulvovaginitis independent of the etiologic agent was 22 to 25 years old. The most common etiologic agent was *Candida Albicans*. About the number of pregnancies and microorganisms in the population, women with multiple pregnancies had infectious vulvovaginitis more frequently.

Among the factors associated with sexually transmitted infections, multiple sexual partners were found to be a predisposing factor that increases the likelihood of developing infectious vulvovaginitis.

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