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ORIGINALES

Risk factors associated to vaginal infections and squamous intraepithelial lesions in university students in Medellín, Colombia

Factores de riesgo asociados a infecciones vaginales y lesiones escamosas intraepiteliales en estudiantes universitarias de Medellín - Colombia

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ABSTRACT:

Objective: To explore the risk factors associated with vaginal infections and squamous intraepithelial lesions of the cervix in university students in Medellín, Colombia.
Materials and methods: Cross-sectional study; a convenience sample of 176 students from the health care field were included. Data were obtained through an anonymous survey that included demographic, clinical, and academic variables, as well as those pertaining to sexual habits. Cervical cytology and direct gram stain of vaginal fluid were taken. The statistical association for vaginal infections and squamous intraepithelial lesions of the cervix was explored through the odds ratio and the 95% confidence intervals (95% CI). A p value <0.05 was considered statistically significant.
Results: Atypical squamous cells of undetermined significance (ASCUS) was found in 9.1% of participants; low-grade cervical squamous intraepithelial lesions in 4.5%, and vaginal infections in 30.7%; bacterial vaginosis was the most common infection. Previous history of HPV has a statistical association with ASCUS OR = 36.69 95% CI (3.56-378.15) and vaginosis by *Gardnerella* OR = 10.57 CI 95% (1.07-104.64), whereas urinary infections had a statistical association for candidiasis OR = 4.46 CI 95% (1.21-16.5).
Conclusions: Our findings can be used as descriptive information regarding the frequency of vaginal infections and squamous intraepithelial lesions of the cervix in university populations, to continue or

improve programs for the promotion and prevention of sexual and reproductive health in young populations.

Keywords: Human papillomavirus; Trichomonas Vaginitis; Candidiasis, Vulvovaginal; Gardnerella vaginalis; Squamous Intraepithelial Lesions of the Cervix

RESUMEN:

Objetivo: Explorar factores de riesgo asociados a infecciones vaginales y Lesiones Intraepiteliales Escamosas de Cuello Uterino (LEICU) en estudiantes universitarias de Medellín-Colombia.

Materiales y métodos: Estudio observacional analítico transversal con una muestra a conveniencia de 176 estudiantes del área de la salud. Los datos se obtuvieron mediante encuesta anónima que incluyó variables demográficas, clínicas, académicas y de hábitos sexuales. Se realizó toma de muestra por medio de citología cérvico uterina y Gram-Directo de flujo vaginal. Se exploró la asociación estadística de la presencia de IV o LEICU con variables de interés a través de la Odds Ratio (OR) y su intervalo de confianza de 95% (IC95%). Se asumió asociación estadística con p<0,05.

Resultados: Se encontró ASCUS en el 9,1%; LEICU de bajo grado en el 4,5%, e infecciones vaginales en el 30.7% de las participantes, siendo la vaginosis bacteriana la infección más común. Además los antecedentes previos de VPH tienen asociación estadística con el ASCUS OR=36,69 IC 95% (3,56-378,15) y con las vaginosis por *Gardnerella* OR=10,57 IC 95%(1,07-104,64), mientras que las infecciones urinarias tuvieron asociación estadística con la candidiasis OR=4,46 IC 95% (1,21-16,5).

Conclusiones: Los hallazgos encontrados pueden servir como información descriptiva acerca de la frecuencia de IV y LEICU en poblaciones universitarias para continuar o mejorar programas de promoción y prevención de la salud sexual y reproductiva, en poblaciones jóvenes.

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Palabras clave: Papillomavirus Humano; Vaginitis por Trichomonas; Candidiasis Vulvovaginal; Gardnerella vaginalis; Lesiones Intraepiteliales Escamosas de Cuello Uterino.

INTRODUCTION

Vaginal infections (VI) are an alteration of the condition of the female genital system, which are multifactorial in origin and are clinically characterized by changes in amount of vaginal discharge, odor changes, irritation, and itching [1–4]. Alterations of the normal vaginal condition are favored by various factors including poor genital-anal hygiene, new or multiple sexual partners (regardless of the frequency of sexual intercourse), bathing in swimming pools or bathtubs, pregnancy, diabetes, parasitosis, urinary or fecal incontinence, stress, congenital malformations of the genital tract, frequent use of antibiotics, hormones, use of oral topical contraceptive preparations, vaginal medications, immunological deficiency, wearing tight clothing, smoking, presence of herpes simplex virus 2 (HSV2) antibodies, and changes in the normal microbial flora such as a loss of production of H_2O_2 by lactobacilli [5–10].

Vaginal infections affect 20-62% of women of reproductive age [11–13] and approximately 20% are the result of alterations caused by medications such as antibiotics [14] or the use of birth control methods [15]. Between 24% and 37% of VIs are sexually transmitted, and 21.5-54.4% [16] affect pregnant women [17–20].

The frequency of vaginal infections by *Candida sp.* in university students varies between 20% and 45% according to international reports [11,14]. In Colombia, publications on these types of studies are scarce as studies have only been conducted in prison populations [21], sex workers [13] and women who seek medical attention due to alterations in vaginal discharge. Findings show that 90% of infections are bacterial in origin, while the rest are fungal or protozoan [22].

The literature reports that the frequency of human papillomavirus (HPV) infection is high in young women. Up to 50% of adolescent women and young adults get HPV infection within the first 4-5 years of being sexually active, of whom 25% develop low-

grade squamous epithelial lesions. However, 90-95% of these infections in young women heal on their own [23].

The aim of this study was to explore some of the risk factors associated with vaginal infections and squamous intraepithelial lesions (SIL) of the cervix in university students in Medellín, Colombia.

MATERIALS AND METHODS

Study Design and Population

A cross-sectional, analytical, observational study was conducted using a convenience sample of 176 students from the health care field aged 18 or older at a university in Medellín who voluntarily participated in the study to undergo a vaginal cytology and direct gram stain of vaginal fluids. The exclusion criteria considered included those who had sexual intercourse or who used a vaginal douche 48 hours prior to the cytology and direct gram stain, those who had menstrual bleeding at the time of the test, those who had never had intercourse, pregnant women, those not covered by the Colombian health system, those who could not undergo the tests based on the main researcher's criteria, and those who refused to sign the informed consent.

Data Collection

An anonymous survey was used, which included demographic and academic variables (age, socioeconomic strata, marital status, and current semester), clinical variables (gynecologic history and pathology, use of contraceptives, frequent use of vaginal douche), as well as variables related to sexual habits such as the use of condoms, frequency of intercourse, and number of sexual partners over the past semester. Thereafter, samples were taken from the students using uterine cervical cytology and direct gram stain of vaginal fluids by students from the histo-cytotechnology program in their last semester at Institución Universitaria Tecnológico de Antioquia, who had been trained and were supervised by professional personnel. All samples were read by bacteriologists and histo-cytotechnologists, and 10% of the samples that were positive for SIL were sent in to be reviewed by a pathologist.

Statistical Analysis

The information was processed and analyzed using SPSS® version 17.0 (SPSS Inc; Chicago, Illinois, USA); under Universidad Pontificia Bolivariana (UPB) license. Quantitative and qualitative variables were described for the statistical analysis. The variables measured at nominal level were described with absolute and relative frequency measures; variables were expressed by means of their maximum, minimum, and median values and interquartile range (IQR) due to the fact that the Kolmogorov-Smirnov test resulted in a non-normal distribution, yielding a p value<0.0001.

The statistical association of the presence of VI or SIL with variables of interest through the odds ratio (OR) and its 95% confidence interval (CI95%) was explored. A p value <0.05 was considered statistically significant.

Ethical Issues

Students were asked to sign the informed consent prior to their participation in the study. Fundamental ethical principles were upheld, information was handled with absolute confidentiality, and the study was approved by the Research Ethics Committee.

The students having positive results for VI and/or SIL on the lab tests were referred to their respective healthcare providers.

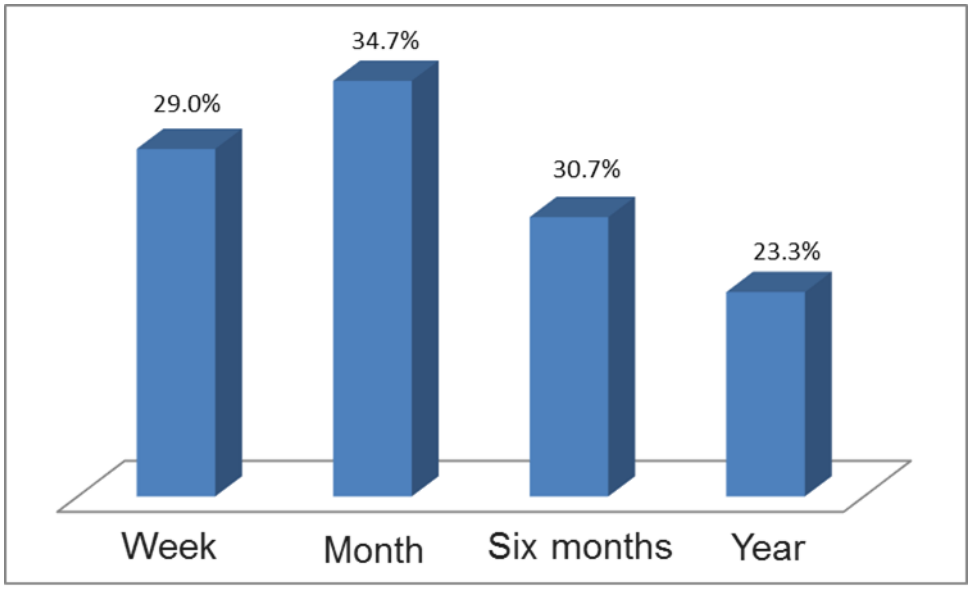
RESULTS

Sociodemographic and Academic Characteristics

The median age of students was 20 years, with IQR (19-24); 91.9% came from low socioeconomic strata (strata one, two or three); 146 students (83.0%) were single at the time of the survey, 17 were in a common law marriage (9.7%), and 10 were married (5/5%); 72.4% were in one of their first four semesters.

The use of vaginal douches was found to be uncommon in those surveyed as only 35 women (19.9%) said they had used them at least once in their lifetime; of these, six (3.4%) had used them in the month prior to being surveyed, and four (2.3%) in the week prior. Regarding contraceptive use, 109 students (61.9%) had used them in the last six months; 29.5% used oral contraceptives, which was the most common method, followed by injectable contraceptives, used by 25%. Of all students surveyed, 125 (71.0%) reported having an active sexual partner; the median age at which they became sexually active was 17, with IQR (15-18), and less than half of the sample (45.5%) regularly used condoms. The frequency of sexual intercourse with penetration is presented on graph 1.

Graph 1. Frequency of sexual intercourse with penetration over the last week, the last month, the last six months, and the last year.



Regarding gynecologic histories, 33 students (18.8%) had been pregnant at least once, of whom 14 (42.4%) aborted; five admitted to having had sexually transmitted infections, four of which were by human papillomavirus (HPV) and one by trichomoniasis. Twenty-six women said to have had vaginal infections over the month previous to data collection, which represents 14.8%, while 13 (7.4%) reported having urinary infections.

Signs and symptoms observed in exams

With respect to the symptoms described by study participants during the tests, 24 (13.6%) had itching, four (2.3%) dyspareunia, and two (1.1%) pelvic pain.

The macroscopic examination revealed 24 women with cervical erosion (13.6%); the same percentage had clumpy discharge, while three (1.7%) had mucopurulent discharge, and one had brown discharge. Thirty-four women (19.3%) had cervical ectropion, and eight (4.5%) had cervical congestion. Cysts were found in three patients and condyloma in two.

Vaginal Infections and Squamous Intraepithelial Lesions

Upon conducting the direct gram stain, 54 positive results (30.7%) were obtained for vaginal infections, of which 34 (63.0%) corresponded to bacterial vaginosis, while 20 (37.0%) were positive for vaginitis by *Candida sp*.

Atypical squamous cells of undetermined significance (ASCUS) were found in 16 students (9.1%), low-grade squamous intraepithelial lesions (LSIL) in eight (4.5%), LSIL by HPV in two, and high-grade SIL (HSIL) and ASC-H in only one student. None were found to have adenocarcinomas.

Factors Associated with VI or SIL

When exploring the statistical association between the variables of interest and the presence of VI or SIL in the exams conducted, it was found that being under age 30 was a protective factor for low-grade SIL (OR=0.13; CI 95%=0.02-0.76). An HPV background was a risk factor for ASCUS (OR=36.69; CI 95%=3.56-378.15) and for vaginosis by *Gardnerella* (OR=10.57; CI 95%=1.07-104.64), while urinary infections were a risk factor for candidiasis OR=4.46; CI 95%=1.21-16.5).

DISCUSSION

In this study it was observed that over half of the participants do not frequently use condoms as a method of avoiding sexually transmitted infections, which is consistent with the literature. For example, it was reported that 23% of participants in a study conducted in Medellín with a comparable population stated they never used condoms during sexual intercourse [(24)]. There were similar observations in Iztacala, México where 45% of university students surveyed expressed they did not always use condoms during intercourse [(25)]; similarly, a study conducted in Asturias, Spain revealed that 34% of university students did not use condoms [(26)].

Regarding the number of sexual partners, data obtained are similar to those found in a university population in Bogotá which reported that 61.8% of participants mentioned only having one partner [(27)]; a similar figure was reported by Universidad del Rosario

de Colombia in 2005, where 74% of participants stated they had had fewer than three sexual partners since they had been sexually active [28]. These similarities are probably related to cultural aspects and could be associated to the average age at which women become sexually active in Colombia.

With respect to the use of contraceptives, it was observed that 61.9% of students had used them within the six previous months. This percentage is lower than data collected in other studies in Colombia with similar populations, such as 82% [27] and 88% [28] in university students in Bogotá. This study revealed that the use of oral contraceptives was the most common at 29.5%, followed by injectable contraceptives used by 25%. These figures are similar to what was reported in a study conducted at a university in Bogotá in 2010 [27], but differ from another study in the same city in 2006 which reported that 44.8% of university students surveyed used anovulatory oral contraceptives, 18.8% used injectable contraceptives, and 31.4% used condoms [29]. Such differences could be explained by the fact that oral contraceptives are Colombian women's preferred self-administered hormonal contraceptive mainly due to the lack of medical advice and the fact that they are sold as over-the-counter drugs [30–32].

Concerning gynecologic history, 18.8% of the population had been pregnant at least once, of whom 42.4% aborted. This differs from what was reported in a study conducted at Universidad Industrial de Santander where only 8% of surveyed students had ever been pregnant [33]. This difference is due to the fact that the number of pregnant teenagers between 2005 and 2010 in the department of Antioquia was greater than in Santander. Thus, the results of this study are similar to data obtained in Antioquia (19.8%) and are near the national percentage (19.5%) [34].

Of the cytologies conducted, 13.6% yielded results with abnormalities. These findings are consistent with those obtained in a group of university students in Popayan where there was a 10% prevalence of cytologic alterations [21], but they differ from what was reported in a study from Universidad Industrial de Santander where 33% of exam results were abnormal [33]. This could be associated to the different sampling techniques used as well as the characteristics such as age, biological variables, and demographic conditions of the participants in both studies.

The most common vaginal infection was bacterial vaginosis, found in 29.5% of students, while 11.4% were positive for vaginitis by *Candida sp.*; these results are consistent with what has been reported in the scientific literature [17,22,35]. With respect to ASCUS, the data found are similar to those reported by Bravo 5% [21], Mount 9.7% [36], and Mangan 4.1% [37]. However, there is consensus that the prevalence of ASCUS and low-grade lesions in adolescents and young women is significantly high and that most are related to infection by HPV [38].

Findings related to SIL present low prevalence in this type of population, which is similar to what has been reported in the literature and can be explained due to the protective factor associated to age found in the present study, which is similar to what has been reported in the literature [2,9,23,26,33–37].

Studies conducted in university populations in Latin America show that students lack knowledge regarding sexually transmitted infections. For example, a study conducted at a university in Medellín found that 69.9% of those surveyed were unaware of how HPV is acquired or transmitted, and 84.9% did not know which diseases are caused by this virus [24]. Another study carried out in Mexico found that 63% of those surveyed

were unaware of the clinical manifestations of sexually transmitted infections and HPV [41].

Although this study did not explore students' knowledge regarding sexually transmitted infections, the study of the prevalence of vaginal infections and infections by HPV is important in this type of population. The correlation with the knowledge regarding these infections and their prevention should also be studied with the aim of establishing promotion and prevention measures with respect to these manifestations. According to the literature, this lack of knowledge puts these types of populations at risk of acquiring infections making it necessary to improve sex education in the university setting and heighten awareness regarding the repercussions of such infections.

The authors consider it imperative for there to be intervention, control, and knowledge of the frequency of vaginal infections in this population since it was found that the average age to become sexually active in women is 17 years. These data are consistent with that which has been reported in other studies [23–26] and correspond to the average age students enter college in Colombia [42], which is why addressing this population in an adequate and opportune manner by offering topics related to sex education could positively impact the prevention of such infections.

Limitations

Due to the fact that a convenience sample was used and since it cannot be guaranteed that the risk factors preceded the event because of the temporality of the study, inferences cannot be made. Therefore, findings regarding risk or protective factors must be interpreted as statistical associations but not as causal associations.

CONCLUSIONS AND RECOMMENDATIONS

The abnormalities in the results of the vaginal discharge and cytology tests are mainly associated to microorganisms and the presence of squamous cell abnormalities. These findings can be used as descriptive information regarding the frequency of VI and SIL in university populations to conduct follow-up studies that may allow to implement, continue, or improve programs for sexual and reproductive health, prevention, detection, and treatment of uterine cervical diseases in young populations.

Since uterine cervical cytology is a screening test, further studies are warranted in which other diagnostic tests are conducted to evaluate the specificity of such tests for the detection of cancer and which allow to associate other factors with this event.

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