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# Epidemiology of sexually transmitted diseases in Río Cuarto, Argentina

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**ABSTRACT.** Sexually transmitted diseases (STD) are a group of transmittable diseases acquired fundamentally through sexual contact. STD are a social problem resulting from demographic explosion and changes in sexual conduct, which affects teenagers and adults of all socioeconomic strata. The goal of this work was to establish the actual state of the different STD within the studied population. Samples of vaginal fluids, endocervical materials and urethral exudates taken from 2,630 patients during five years were processed. 1,341 samples tested positive to one or more of the microorganisms, 1,099 corresponding to female patients and 242 to male patients. The microorganisms found in women were: *Gardnerella vaginalis* (39.1%), *Candida albicans* (21.3%), *Trichomonas vaginalis* (16.8%), *Chlamydia trachomatis* (11.5%); *Neisseria gonorrhoeae* (3.4%), *Mycoplasma hominis* (2.6%); *Ureaplasma urealyticum* (4.1%) and *Treponema pallidum* (1.6%). Associations were: *Gardnerella vaginalis* with *Trichomonas vaginalis* (6%), *Gardnerella vaginalis* with *Candida albicans* (5.1%); *Trichomonas vaginalis* with *Neisseria gonorrhoeae* (2.2%) and *Gardnerella vaginalis* with *Chlamydia trachomatis* (2.1%). In men, *gonococcic urethritis* represented 37.8%, *non-gonococcic urethritis* 55.4% and *Treponema pallidum* 6.8%. A decrease in syphilis, *gonococcic urethritis* and *gonococcic cervicitis* was observed, increasing the prevalence of *non-gonococcic urethritis* and *cervicitis*. This study showed that in our environment the actual tendency of STD is still high.

**Key words:** STD, *Chlamydia*, *Mycoplasma*, *Gonococcus*.

## INTRODUCTION

Sexually transmitted diseases (STD) are a group of transmittable diseases acquired mainly through sexual contact. Nowadays, they form the most frequent group of infectious diseases obligatorily reported in most countries.<sup>1</sup>

(STD) have provoked a great concern in the medical community in the last decade, mostly because of the exaggerated increase of some diseases directly related to sterility, infertility, pelvic inflammatory disease, ectopic pregnancy, etc.<sup>2,3</sup> Though infection rates are similar in men and women,<sup>4,5</sup> newborns bear the greatest weight of complications and serious sequels.<sup>4,5</sup>

The preciseness and validity of information regarding case notification, determines the validity of the rate of incidence of

**RESUMEN.** Las enfermedades de transmisión sexual (ETS) son un grupo de enfermedades transmisibles adquiridas fundamentalmente por contacto sexual. Las ETS son un problema social que resultan de la explosión demográfica y cambios en la conducta sexual, lo cual afecta a adolescentes y adultos de todos los niveles socioeconómicos. El objetivo de este trabajo fue establecer el estado actual de las diferentes ETS dentro de la población estudiada. Se procesaron muestras de fluidos vaginales, materiales del endocervix, y exudados uretrales tomados de 2,630 pacientes durante cinco años. 1,341 muestras resultaron positivas a uno o más de los microorganismos, 1,099 corresponden a pacientes femeninos y 242 a masculinos. Los microorganismos encontrados en las mujeres fueron: *Gardnerella vaginalis* (39.1%), *Candida albicans* (21.3%), *Trichomonas vaginalis* (16.8%), *Chlamydia trachomatis* (11.5%); *Neisseria gonorrhoeae* (3.4%), *Mycoplasma hominis* (2.6%); *Ureaplasma urealyticum* (4.1%) y *Treponema pallidum* (1.6%). Las asociaciones fueron: *Gardnerella vaginalis* con *Trichomonas vaginalis* (6%), *Gardnerella vaginalis* con *Candida albicans* (5.1%); *Trichomonas vaginalis* con *Neisseria gonorrhoeae* (2.2%) y *Gardnerella vaginalis* con *Chlamydia trachomatis* (2.1%). En hombres la uretritis gonocócica representó el 37.8%, La uretritis no-gonocócica el 55.4% y *Treponema pallidum* 6.8%. Se observó una disminución en la frecuencia de sífilis, uretritis gonocócica y cervicitis gonocócica, así como un incremento en la prevalencia de uretritis no-gonocócica y cervicitis. Este estudio demostró que en nuestro ambiente la actual tendencia de ETS es aún alta.

**Palabras clave:** ETS, *Chlamydia*, *Mycoplasma*, *Gonococcus*.

(STD). Due to the fact that in our country, the notification of cases is not exact, we have to use data pertaining to the incidence of (STD) that comes from industrialized countries.

It is important to note that neither syphilis nor (STD) in general are apart from AIDS, and that they increase the probability of HIV infection.<sup>6</sup>

The recognition of new pathogens as a cause of (STD) the increase of the frequency of such diseases and a wider distribution among the affected population, has made these diseases one of the most important public health problems.<sup>7-9</sup>

To that effect, we have considered important to do this work, in order to, know the actual state of (STD) in our environment, and to create conclusions that may allow us to improve control actions adequately for the various infections found in the studied population.

## MATERIAL AND METHODS

2,055 intermenstrual samples of vaginal exudates and endocervical material and 605 urethral samples were studied.

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The samples came from 2,630 patients who had attended the Gynecology and Urology Service of the Hospital Central de Río Cuarto and also a private service because of diverse diseases. This study took place during the period between July 1994 and July 1999. All patients were interviewed according to a protocol based on the following: personal data (name, age, occupation, level of study), reason of visit, contraceptive method used, history of venereal disease, sexual habits, clinical signs and symptoms, most prevalent within the area.

The study was done using Gram stain on direct fresh smears and the results were reconfirmed by selective culture and identified with biochemical tests for isolated microorganisms.<sup>10</sup>

All patients had a blood sample taken to perform a serum test for syphilis (qualitative and quantitative VDRL). Cases found suspicious of chancre were tested using Fontana-Tribondeau coloring. In female patients, samples, were taken after collocation of speculum. An hansa de fondo was used for exocervical samples and a sterile swab was used for samples taken from the endocervix.

Exocervical samples were processed in the following way: *Trichomonas vaginalis* direct fresh smear, prolonged Giemsa, Gram stain, culture in brain heart infusion broth (0.05 g of L-cisteine hydrochloride were added to 100 ml of this medium) to grow *T. vaginalis* in Sabouraud agar and develop yeasts and blood agar. The presumptive identification of the yeasts at the species level was done by isolation in Chrom-agar *Candida*,<sup>11</sup> which is a chromogenic medium. For the final identification, carbohydrates were used for the production of germination tubes.

Colonies suspected to be *Gardnerella vaginalis* which had developed in bloodagar were identified through the following schema: Diffuse  $\beta$ -hemolysis in human blood agar at 5%, inhibition with hydrogen peroxide at 3%, sodium polianetolsulfonate at 5% (SPS) and sodium hipurate at 1% and starch.<sup>12</sup>

Endocervical samples were treated with Gram stain, methylene blue for polymorphonuclear (PMN) counts and culture in Thayer-Martin medium. All cultures were incubated in a CO<sub>2</sub> atmosphere of 3-10% for 24-48 h at 37°C.

Suspected gonococci colonies were tested in several ways: oxidase test and glucose, maltose, saccharose tests, and a  $\beta$ -lactamase production assay.<sup>13</sup> For detection of *Chlamydia trachomatis* de ELISA technique was used in a solid phase with monoclonal antibodies (Chlamyfast-IM).<sup>8</sup>

Quantification of urogenital mycoplasmas (*M. hominis* and *Ureaplasma urealyticum*) was performed using the Mycofast commercial equipment (IM) with the corresponding test for sensitivity to the antibodies commonly formed in these infections.<sup>9</sup>

Extraction of the material from male patients was done after a 3 h period without urination to facilitate the accumulation of secretions. When secretions flowed spontaneously, the first

portion was discarded to avoid contamination. The secretion was taken directly using a short diameter swab at 2-4 centimeters from the meatus. This material was processed in the following manner: direct fresh smear, Gram stain, methylene blue for PMN count and culturing in Thayer-Martin medium plaques. The analysis of *C. trachomatis* and *U. urealyticum* was done using the ELISA and Mycofast techniques respectively.

## RESULTS

Out of 2,630 studied patients, 1,341 (51%) presented positive results, corresponding to 1,099 (82%) women and 242 (18%) men. The majority of patients were characterized by a low level of income, promiscuous relationships and 2.5% of patients had engaged in prostitution.

The frequency of isolated microorganisms in female patients was: *G. vaginalis* 39.1% (430/1,099), *C. albicans* 21.3% (234/1,099), *T. vaginalis* 16.8% (185/1,099), *C. trachomatis* 11.5% (126/1,099), *N. gonorrhoeae* 3.4% (37/1,099), *M. hominis* 2.6% (29/1,099), *U. urealyticum* 4.1% (45/1,099) and *T. palidum* 1.6% (18/1,099). Among the cervicitis causing agents we found *C. trachomatis*, followed by urogenital mycoplasmas and *N. gonorrhoeae*.

The associations most frequently found in females were: *G. vaginalis* with *T. vaginalis* (6%), *G. vaginalis* with *C. albicans* (5.1%), *T. vaginalis* with *N. gonorrhoeae* (2.2%), and *G. vaginalis* with *C. trachomatis* (2.1%).

In women who presented a microorganism associated with *Candida*, 80% corresponded to the *C. albicans* species, 10% to *C. glabrata* and 10% distributed between *C. krusei* and *C. tropicalis*.

The age group with greatest STD incidence was between 20 and 29 years of age, followed by the 30-39 age group.

A net predominance of non-gonococcal urethritis (NU) (55.4%) over gonococcal urethritis (GU) (37.8%) was observed in males, followed by a low percentage of syphilis (6.8%). In all cases the syphilis diagnosis was done through the observation of evident lesions and a reactive VIDRL with values > 1/8 corresponding to the precocious period of the disease.

When comparing the results of the spread and the urethral culture for the diagnosis of GU, a sensitivity of 93.4% and a specificity of 99.2% were observed (Table 1).

In this work, when studying the relation between spread and culture of the exocervix for the diagnosis of bacterial vaginosis (BV), we observed that the presence of guide cells in the vaginal flow spread had a good correlation with the diagnosis of BV and the presence of *G. vaginalis*. Comparing these parameters we proved that the most appropriate criterion to predict or discard BV was the presence of guide cells in the Gram stained spread since it yielded a better evaluation of the vaginal flora (Table 2).

**Table 1.** Comparative results of spread and urethral culture for the diagnosis of gonococcal urethritis.

Spread	(+)	Culture (-)	Total
(+)	85	4	89
(-)	6	510	516
Total	91	514	605
S = 93.4%		E = 99.2%	

S = Sensitivity; E = Specificity

**Table 2.** Representative parameters of Gram stained spread confronted with diagnosis of vaginosis and/or vaginitis.

Spread	<i>Gardnerella vaginalis</i> culture		Total
Clue cells	(+)	(-)	
(+)	415	3	418
(-)	15	1,622	1,637
Total	430	1,625	2,055
S = 96.5%		E = 99.8%	

**Table 3.** Comparative results obtained from inflammatory response and solid phase ELISA with monoclonal antibodies for the diagnosis of *Chlamydia trachomatis*.

Endocervical Spread	(+)	Chlamifast-IM* (-)	Total
With inflammatory response > 10 PMN	96	6	102
Without inflammatory response	30	1,923	1,953
Total	126	1,929	2,055
S = 76.2%		E = 99.6%	

PMN = Polymorphonuclears.

**Table 4.** Sensitivity and specificity of fresh smear test and culture for the diagnosis of *Trichomonas vaginalis* in feminine samples.

Fresh smear		<i>Trichomonas vaginalis</i> Culture	
(+)	(-)	Total	
(+)	180	2	182
(-)	5	1,868	1,873
Total	185	1,870	2,055
S = 97.3%		E = 99.9%	

For the detection of *C. trachomatis*, the presence of an inflammatory response showed a high specificity (Table 3). The prevalence of *C. trachomatis* symptomatic women was of 8.6% and in asymptomatic women of 2.9% ( $p < 0.00001$ ).

The culture of *T. vaginalis* from female samples does not seem to possess great advantages over the microscopy of the direct fresh smear test which presents a specificity of 99.9% (Table 4).

## DISCUSSION

The actual state or tendency of these infections in our environment shows a progressive decrease of the classic STD such as gonorrhea and syphilis. It must be noted that STD nowadays have widened their spectrum and now include a great variety of mycotic, parasitic, viral and bacterial microorganisms. In this study we continue to observe that the venereal diseases that have increased are those produced by chlamydias and urogenital mycoplasmas which cause urethritis, cervicitis, salpingitis, EPI, etc. These results are comparable to those found by other authors.<sup>14,15</sup> Honestly, we do not know if these results and due to an increase of incidence or if the diagnosis techniques have improved for *C. trachomatis* and urogenital mycoplasmas.

For the proper diagnosis of chlamydias, the presence of an inflammatory response must be followed by some of the specific lypopolysaccharide detection techniques for that organism.

This high percentage of NU coincides with the actual results, which show these infections increasing progressively and displacing gonococcal urethritis (GU). Nevertheless, in the last period of this study we noted an increase of GU. We also noted a greater proportion of patients with blenorrhagia than with syphilis-situation that has presented itself worldwide as well as in our country.<sup>16</sup> For the diagnosis of GU, the Gram staining of the spread is a simple, quick technique and it presented a high sensitivity and specificity in this study, which makes it useful and trustworthy for the presumptive diagnosis.

Even though the role played by *G. vaginalis* in STD is very controversial, the percentage found in this study corresponded to women with a clinical symptomatology and with a *G. vaginalis* count  $> 10^5$  UFC/g. When correlating the culture and the presence of clue cells, this last parameter presented a high sensitivity and specificity, proving to be the most important criterion for the presumptive diagnosis of BV.<sup>17</sup>

Based on studies done with a chromogenic medium, we considered Chrom-agar *Candida* largely useful to facilitate the presumptive isolation, differentiation, and identification of the different species of *Candida* these results are similar to those obtained by Giusiano et al.<sup>11</sup>

The investigation of sexual habits helped detecting the oligosymptomatic localization of some infections such as rectal and faringeal gonococchia. Sexual orientation has a huge influence on the risk of acquiring a STD, since there usually is a relation to the number of sexual partners and sexual practices.

There are social and demographic markers for STD risk. One of them is age, whose influence varies extraordinarily. In our environment, the group of individuals between the ages of 20 and 29, has the greatest incidence of STD and drug addiction is one of the most important determinant of risk. To a lesser degree is alcohol consumption, which may affect the decision of having sexual intercourse with a new partner or may influence the selection of partners without the proper precautions. Other factors, such as low socioeconomic level, poor education, inadequate control of women dedicated to prostitution, an early sexual initiation, increase of promiscuity, family instability, and a violent environment may all be influential on sexual behavior and consequently on the risk of contracting an STD.

STD constitute without any doubt a grave problem for public health, a serious danger for the family and an important cause of physical and mental incapacitation. In general STD have worse consequences for women and their children than for men. This is because, firstly, STD take course without symptoms in women and then, the symptomatology is less specific. Also, infected women have a greater risk of suffering from complications, which consequently may cause serious and permanent sequels such as infertility, cervical carcinoma and complications for the fetus and newborn.

Years of prevention campaigns have been wasted because of the ignorance about the importance and transcendence of STD. A decade ago there were no prevention campaigns against these diseases. There were never really any, and even today they are not jointly engaged by all the specialties, as it would be expected. Therefore, talking about possible prevention measures implies the necessity of implementing educational campaigns that inform the public about the following themes: the importance of having a stable sexual relationship; of avoiding the multiplicity of sexual encounters; of the use of condoms; and of the fight against STD and AIDS, which deserve to be considered to make the reduction of transmission risk factors possible. These measures are the axis of STD prevention.

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