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Syphilis and *Chlamydia trachomatis* in Males from Northern Mexico with HIV-AIDS

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Abstract: *Introduction*: Subjects with HIV, particularly those with high-risk sexual practices, such as men who have sex with men (MSM), frequently present concurrent infections of Sexually Transmitted Infections (STIs). Therefore, in this study, we determined the frequency of Syphilis, *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG), and *Ureaplasma urealyticum* (UU) infections in a group of HIV-seropositive males in HIV control and surveillance programs of the Region Laguna, Mexico. *Methods*: Ninety-seven HIV-seropositive males were included, with whom a peripheral blood sample was taken to determine infection by syphilis, in addition to a urethral-scrape sample for the detection of infections due to CT, NG, and UU. A questionnaire was applied to all participants to take their sociodemographic variables, and also their clinical files were reviewed to obtain their historical antecedents of other STIs. *Results*: The subjects included in the study, 69% were MSM. The results indicated that 12.36% of the samples were positive for STIs, which 10.3% were infections because of syphilis and 2.06% due to CT; none of the samples were positive for NG or UU. *Conclusions*: The results reflect the relevance of evaluating the frequency of STI in subjects infected with HIV in this population, in that co-infections can lead to an unfavorable evolution.

Keywords: Syphilis, Chlamydia Trachomatis, STI, HIV

1. Introduction

According to the latest report of the Mexican National Center for the Prevention and Control of HIV and AIDS (CENSIDA), there are approximately 149,707 people infected with the Human Immunodeficiency Virus (HIV). For 2018, 37.9 [32.7 - 44.0 million] of people worldwide lived with HIV; 1.7 [1.4 - 2.3 million] people recently became infected with HIV [1] and also, it is generally accepted subjects with HIV usually have other concurrent Sexually Transmitted Infections (STIs). There are more than 30 infections of this type, which can be noted for their prevalence, such as those caused by *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG), *Trichomona vaginalis* (TV), *Ureaplasma urealyticum* (UU) and diverse subspecies of *Treponema pallidum* (TP) bacteria that causes syphilis, which increases the risk of pelvic inflammation, urethritis, infertility and ectopic pregnancy [2]. Worldwide, more than one million curable sexually transmitted infections (STIs) occur every day. According to WHO global estimated for 2016, there were roughly 376 million new infections of the four curable STIs – chlamydia, gonorrhea, syphilis and trichomoniasis. The seroprevalence of syphilis among key populations such as female sex workers (FSWs) and men

who have sex with men (MSM) is an important indicator of progress in STIs control. The median reported syphilis seroprevalence for FSWs was 3.2%, in contrast to 6.0% for MSM [3]. The global prevalence estimated of new cases of curable STIs in 2015 was Chlamydia 127 million, gonorrhea 87 million, syphilis 6 million and trichomoniasis 156 million [2]. In Japan, there was an increase between 2012 and 2016 of 80.55% of cases of TP 77.5% of this population were men and 93.1% MSM with high-risk practices [4]. In the U. S. in 2014, 1,441,789 new cases of CT related infection were registered, as well as 350,062 by NG, with an infection rate of 110.7 cases per 100,000 inhabitants [5]. Otherwise, Ureoplasma-associated infection has presented an increasing frequency in HIV-infected subjects, with a prevalence ranging from 6 to 12.3% [6]. In Mexico, a study showed that the prevalence of STIs in female sex workers was for syphilis 7.8% (range 0% -17.2%), chlamydia 15.3% (range 5.7% - 32.2%), gonorrhea 2.9% (range 0% -13.8%) and any HIV / STI 23% (range 9.9% - 46%) [7]. The presence of concurrent infections due to any of these bacteria is a risk factor for HIV [8, 9]; This is because, by breaking the epithelial barrier of the genital tract, this facilitates the access of the virus to the target cells under the epithelial barrier [8, 10]. Alternatively, people infected with HIV are more susceptible to other STIs, since they are immunosuppressed and less able to develop an adequate response to sexually transmitted pathogens [8, 11]. Therefore, as described by other authors, the prevalence of co-infection between some STIs and HIV is 14%, particularly in the group of men who have sex with men (MSM) [12-16]. In a study at the Hospital Clinic in Barcelona, Spain, which included 220 subjects diagnosed with syphilis, another concomitant STIs were reported, of which 7% were HIV [17]. In several studies, the prevalence of HIV and NG co-infection ranged between 0.3 and 4.3% [16, 18-20]. Sony and White reported in 2011 that 2.6% of asymptomatic subjects who belonged to a group with high-risk practices, CT related infections were found in the urethral region [21], while in another study published in 2011, in The Netherlands, they discovered in MSM, infections in the anal region due to CT were more common than those because of GN, with a frequency of up to 8%. According to data from the Ministry of Health in 2017, there were 4,703 cases of acquired syphilis 2,891 men (61.5%) and 1,812 women (38.5%). There are seven states with the highest prevalence of syphilis in Mexico. The Epidemiological Bulletin, the National Epidemiological Surveillance System and the Unique Information System mentioned the cases of syphilis in Coahuila were 18, in Durango zero, Genital Herpes in Coahuila 81 and Durango 6 cases [22]. Since HIV/AIDS was described in 1981, preventive measures have been focused mainly on the use of the condom as a barrier method, giving little importance to STIs as concurrent factors that increase the risk of HIV-associated contagion. As a consequence, the magnitude of this problem is unknown, which limits the possibilities of taking appropriate measures in terms of diagnosis and treatment. The objective of this study was to determine the frequency of infections associated with CT, NG, syphilis, and UU in a group of HIV-seropositive subjects of masculine gender belonging to the Region Laguna, Mexico programs of HIV control and surveillance.

2. Materials and Methods

Before carrying out the study, the project was submitted for review by the Bioethics Committee of the Faculty of Medicine of the Autonomous University of Coahuila. This research is following the provisions of the Helsinki Treaty and the federal health law since only one viral load was added to an interview to investigate demographic aspects, a urethral scraping and a peripheral blood collection were performed in the usual way for control purposes.

2.1. Participants

Data and samples were taken from two programs of institutions located in the Region Laguna Mexico of the states of Coahuila and Durango. Both institutions specialized in HIV. This research included ninety-seven samples of male subjects with a confirmed diagnosis of HIVAIDS, who previously signed an informed consent document. Another sample was taken from consecutive cases that arrived at HIV / AIDS care centers. People with HIV from the study came from the Ambulatory Care Center for the Prevention and Care of AIDS and Sexually Transmitted Infections (CAPASITS) and the hospital comprehensive care service (SAIH) through an interview they answered a questionnaire on sociodemographic aspects, sexual behavior and recently drugs use. The following research was approved by the Bioethics Committee of the Medicine Faculty of the Autonomous University of Coahuila, in Torreon, Mexico with the number 02-01/13.

2.2. Syphilis Test

For the diagnosis of Syphilis, we took a sample of peripheral blood from each subject to perform the rapid carbon plate flocculation test or the determination of Rapid Plasma Reagin Serum (RPR, Licon).

2.3. Chlamydia, Gonorrhea and Ureaplasma Test

For the diagnosis of CT, NG, and UU, we carried out a urethral scraping to extract the exudate by using a cotton swab with calcium alginate (Fisherbrand), introducing it approximately 4 cm. We placed the sample in Falcon tubes with 2 ml of PBS as the transport medium. The extraction of DNA was performed by the salting-out method. The purity and concentration of DNA using the NanoDrop Model 1000 spectrophotometer, and the DNA brought to a concentration of 20 ng per microliter. To carry out the final PCR, we used the MPCR kit for Sexually Transmitted Diseases (Maxim Biotech, Inc.), with an initial denaturalization cycle of 95°C for 5 minutes, followed by 35 cycles of denaturalization at 94°C for 1 minute, alignment at 65°C for 2 minutes, extension at 70°C for 2 minutes and a final extension at 70°C for 10 minutes. The PCR amplified products were processed

in 2% agarose gels by conventional electrophoresis at 100 volts for 45 minutes and observed in a conventional transilluminator after staining with ethidium bromide.

2.4. Statistical Analysis

The data were represented as the mean +/- SEM and the frequencies performed using IBM SPSS statistics 20.

3. Results

The study population was composed of 97 male, diagnosed with HIV, with a mean age of 38.7 years, whose clinical and sociodemographic data are summarized in Table 1.

Table 1. *Clinical and sociodemographic data.*

***N*=97**	**Mean**	**SD**
Age	38.70	±11.3
The average number of sexual partners before the diagnosis	3.69	±11.3

	N	**%**
Condom use	47	48.45
Schooling College	32	32.9
High School	21	21.6
Middle School	29	29.9
Elementary School	15	15.4
Civil status Unmarried	65	67.0
Married	14	14.4
Divorced	7	7.2
Widowed	1	1.0
Cohabitation	10	10.3
Sexual preference Heterosexual	30	30.9
Homosexual	48	49.5
Bisexual	19	19.6
Sexual practice		
Active	25	25.7
Active/passive	40	41.2
Active, passive, fellatio	2	2.0
Passive	18	19.6

The results of the co-infections are described in Table 2.

Table 2. *Historical antecedents of Sexually Transmitted Diseases (STD).*

Type of Infection	**N**	**%**
Herpes	29	28.9
Hepatitis	12	2.37
Condylomas	9	9.27
Molluscum contagium	2	2.06
Neisseria gonorrhoeae	11	11.34

The results not shown in Table 1 indicate that the subjects studied ingested more than three alcoholic beverages weekly and the most commonly used drugs were marijuana and cocaine. The clinical records of patients revealed a historical antecedent of herpetic infections, hepatitis, condylomas, molluscum contagiosum, and gonorrhea, according to those shown in Table 2. As a result of the tests performed in this study, 12.36% of the samples tested were positive for STIs, 10.3% for syphilis and 2.06% for CT; none of the samples were positive for NG or UU (Table 3).

Table 3. *Results of SRI in HIV-seropositive subjects.*

Infection	***N*=97**	**%**
Syphilis	10	10.3
Chlamydia trachomatis	2	2.06
Neisseria gonorrhoeae	0	-----
Ureaplasma urealyticum	0	-----

4. Discussion

Sexually Transmitted Infections in subjects with HIV are a common problem in global health, which has been described by several studies in diverse populations [23]. The group studied in the present work has an average age of 38.70, which remains constant and compared to other studies showing an average of 40 years, [23] however, on the other hand, there are some epidemiological data of high-risk sexual practices for HIV/STI, such as lack of condom use, prevention, drug use, and alcoholism [24]. Some authors mention the relationship between syphilis co-infection and HIV associated with 158 the behavior and social environment in which the individual [25]. The results of the present 159 study confirm these findings (Table 1) because we found a high frequency of men who had sex 160 with men. After all, only 31% have heterosexual relationships, Centers for Disease Control 161 (CDC) in Atlanta, Georgia, USA remarks a frequency of 63% of men who have sex with men 162 [5], which confirms to be a risky sexual practice, in addition to 66.9% having a preference for 163 active sexual practices. 51.5% of the population reports that they do not use condoms and, also, they do not maintain 165 a constant sexual partner, since at least 67% are single, therefore it is suggested that this is a 166 population at risk of STIs. According to a study conducted in the United Kingdom in 2014, the use of alcohol and drugs has implicated as a risk factor for contracting STIs [26], because it decreases self-care in sexual relations [27]. In our study, we found that 58% of the population consumes alcohol and 25% consume drugs. Some studies mention a connection with alcohol abuse, depressive symptoms and the risk of contracting a sexually transmitted infection [28]. This evidence leads us to study the frequencies of STIs in our population, as well as their relationship with other studies.

In a study conducted between 2007 and 2011 in Burkina Faso, the authors described a frequency of 6.4% for NG in women infected with HIV who were under antiretroviral therapy [20], while another study published in 2011 in the Netherlands reported a frequency of 4% of CT and NG in the urethral region [29]. In contrast, we did not find positive cases for NG in this study due to its easy detection, however, according to the clinical record of the subjects, at least 11.34% arrived positively for NG, so it is inferred that a higher STIs risk for HIV is exciting. The types and frequencies of STIs in HIV seropositive subjects vary among the different populations studied. The bacteria that occur most frequently in this group of subjects, according to various authors, are CT, NG, and TP. The most frequently infected sites are the urethra and rectum, although there are

other sites of infection, such as the pharynx and larynx [17, 21, 29, 30]. Due to the lack of information on studies in Mexico on syphilis performed in men, it has just been described in female sex workers as low frequency [31].

In a study conducted in the United Kingdom in 2011, the authors described a frequency of CT infection of 12.4% and 5.5% for NG [21]. These results are very similar to those described in an Australian population, in which the frequency was 10.8% for CT, 5.3% for syphilis and 7.1% for NG [15] (15). The frequencies of CT and NG infections in this study were lower than those found in these populations, with only 2% and 0%. Even though; the frequency of syphilis (10.3%) in the sample we analyzed was higher than that found by Mulhall and his colleagues in the Australian population. In contrast, the frequencies of STIs found in this study are similar to those described by [16] in the Canadian population (table 3).

In a study in Nepal, the frequency of infections by CT, syphilis, and NG is generally low, with 1.3%, 1.2%, and 2.8%, respectively, with a frequency of CT similar to those described in the Canadian and Mexican population. Meanwhile, the frequency of TP in Nepal was much lower than that described in the rest of the populations analyzed, including our sample [19], which depends on the prevention methods currently used in the populations, to reduce STIs. Concerning infections due to it has described that this can occur in up to 40% of the population [30]; however, in this study, a positive sample was not found, which suggests that it is not a characteristic infection of this population.

In the analysis of the results we found some limitations such as the sample size, because of this, it is proposed to extend the sample for future studies, due to the importance of knowing in detail the frequencies of STIs, to implement prevention, also, it should be noted that the use of the condom before and after the diagnosis of HIV can have a potential impact to avoid contracting other infections. Therefore, it is proposed to analyze it in future research.

5. Conclusions

In conclusion, the results of this and other studies have demonstrated the importance of knowing the frequency of STIs in HIV-infected subjects, since the combination of HIV and STIs can expose these subjects to reinfections with other viral types or subtypes, increase viral load, further more compromise immune status and faster progression to AIDS. The diagnosis of STIs could serve as an indicator of the effectiveness of surveillance, clinical management, and timely treatment in care centers for these patients, in order to improve the quality of life of people living with HIV / AIDS.

Data Availability

The data used to support the findings of this study are included in the article. Conflicts of Interest

No author has any conflict of interest to declare.

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