Infection by Human Papillomavirus amongst female inmates in a social re-adaptation centre in South West Mexico

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ABSTRACT

Introduction: The aim of this work is describe the epidemiology of HVP amongst female inmates.

Material and methods: A total of 82 women were studied in a cross sectional study. Epidemiological data were collected through a direct interview. Samples of cervical cells were taken. HPV and genotypes were identified by molecular test.

Results: Global HPV prevalence was 20.7%. Fifteen different genotypes were identified 60% low risk HPV, 26.7 % high risk HPV and 13.3 % were not classified in any of the two groups. Types 6/11were the most common. 23.5% (04/17) of HPV positives samples had multiple infections, 3 with 2 genotypes and one with 3. Association between infection with HPV and smoking was found, p= 0.0258, OR 3.79 IC 95% (1.01-15.58).

Key words: uterine cervical neoplasms; prisons; women; Mexico; tobacco; hiv; risk factors; sexually transmitted diseases.

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INTRODUCTION

Cervical cancer is the second most common cause of cancer death for women worldwide: every year 500,000 new cases are detected [1].

Mexico is a highly prevalent country for cervical cancer: in 2008 the national mortality rate was estimated at 9.1/100,000 women with 4031 deceases: something which represents a Mexican woman dead every 2 hours. States in South Mexico have still higher rates that Northerner states. Yucatan is located in South-West Mexico: in 2008 its mortality rate for cervical cancer outstripped the national rate: 11.9/100,000 women [2].

The infection by human papillomavirus (HPV) is, beyond any doubt, a necessary condition for the development of cervical cancer: the presence of viral DNA has been proven in 97% of cervical cancer samples [3].

The infection by HPV is the most common sexually transmitted disease (STD): 70% of sexually active women become infected at least once throughout their lives [4, 5]. In Mexico, in 2008 an incidence of 41.25/100,000 women was reported with an increased value in the 25 to 44 age range. In the state of Yucatan, in the same year, the incidence was 28.71/100,000 women [6].

Currently, over 200 types of HPV have been described -of which 40 infect the human genital tract [7]. According to their capability to induce malignant lesions they have been classified in: carcinogenic or high risk types (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 73 and 82), non-carcinogenic or low risk types (6, 11, 40, 42, 43, 44, 54, 61, 70, 72, 81 and 108) and probably carcinogenic (26, 53 and 66) [8].

Social re-adaption centers are considered spaces where several risk factors concerning the acquisition

of STD co-exist [9]. Therefore, its population is considered to be vulnerable.

Few studies have approached the problem of HPV infection among imprisoned women, with a reported prevalence ranging between 20.1% and 46% depending on the population under study [10-13]. In Mexico, there is no epidemiologic data on HPV among imprisoned women hence; this study intends to describe the epidemiology of the HPV infection in women deprived of freedom in the state of Yucatan, Mexico.

MATERIALS AND METHODS

The state of Yucatan is located in South-West Mexico. According to the National Institute of Statistics and Geography (INEGI in Spanish) in 2000 there was a population of 1,658,210 people: 51% men and 49% women. In such state there are three prisons located in Merida, Tekax and Valladolid. Merida is the capital city and it counts upon the main prison. Valladolid is to the east and Tekax to the south of the state. At the moment of the study 130 women were imprisoned as follows: 120 in Merida, 5 in Tekax and 5 in Valladolid.

A cross-sectional study was carried out from September 2008 to February 2009. Prior approval of the three facilities was sought, and then the project was explained an all inmates were invited to join in. All the women who voluntarily accepted to take part signed an informed consent form. In order to gather information on social, demographic and HPV infection related variables a structured interview was applied, carried out by trained qualified staff. Such instrument included the following information: age, education level, occupation, marital status, place of residence; sexual history: age of first sexual intercourse, number of sexual partners both inside and outside prison; reproductive health history: number of pregnancies, contraceptive methods, past history of STD, previous Pap smears, smoking and drug abuse.

SAMPLE COLLECTION AND DNA EXTRACTION

Two cervical cell samples were collected by means of a cytology brush: one for cervical cytology analysis and the other for HPV screening, the later was placed on a transport means. The slides for cytology diagnosis were sent to a pathologist for analysis. The samples for virologic analysis were stored at -70ºC until processing was carried out.

DNA extraction was performed by means of the DNAeasy Blood and Tissue Kit (QIAGEN), according to the manufacturer's instructions. To evaluate the quality of DNA an amplification of a 260bp segment in the human β-globin gene was performed by means of the initiators PC04 and GH20 [14].

HPV IDENTIFICATION AND TYPIFICATION

As to determine the infection by HPV genomic amplification was performed with the polymerase chain reaction (PCR) using universal oligonucleotide primers MY09/11 which amplify a 410bp- long conserved segment of gene L1 [15].

Genotype identification was performed by means of a nested multiplex PCR. In the first amplification assay oligonucleotide primers amplifying a 630bp long region of genes E6/E7-common to all genotypes-were used. Later 4 further amplification assays were performed on each sample, using high risk HPV specific oligonucleotide primers (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59 and 68), and low risk HPV specific ones (6, 11, 42, 43, 44), using a 3µl DNA template from the first amplification [16]. Samples previously typified were used as positive controls; the mixture of PCR without DNA was used as negative controls. Amplification samples were viewed in 8% acrylamide gel, with silver nitrate staining using 50 and 100 bp weight markers. Statistical analysis was performed by means of SPSS v. 17 to evaluate the percentage as well as the frequencies and measures of central tendency. To determine the association between HPV infection and the variables assessed, chi-squared testing and odds ratio with EPI INFO v.6.0 software were used.

RESULTS

Out from the 120 women hosted at Social Re-adaptation centers at the time of the study 82 (63.07%) accepted to take part in it: 72 (87.5%) were in Merida, 5 (6%) in Tekax and 5 (6%) in Valladolid. Social and demographic features are depicted in Table 1. In general, 85.4% had been born in the state of Yucatan and the average age was 36 years (ranged between 20 and 72). As far as education and occupation are concerned 47.6% stated to be a housewife, and less than 50% had reached secondary education; 46.1% cohabit with their partners. The most common causes

	HPV Infection		
	Positive (17)	Negative (65)	Total (82)
	N (%)	N (%)	N (%)
Marital status			
Single	4 (23.5)	11(16.9)	15 (18.3)
Married or cohabiting	11(64.7)	39 (60.0)	50 (60.9)
Separated/Divorced	1(5.9)	9 (13.8)	10 (12.1)
Widower	1(5.9)	6 (9.2)	7 (8.5)
Mean Age (years)	32	36	36
Birthplace			
Yucatan	15 (88.2)	53 (81.5)	68 (82.9)
Other state	2 (11.8)	12 (18.5)	14 (17.4)
Education level			
None	2 (11.8)	9 (13.8)	11 (13.4)
Primary	8 (47.1)	18 (27.7)	26 (31.7)
Secondary	6 (35.3)	24 (36.9)	30 (36.6)
Preparatory and University	1 (5.9)	14 (21.53)	15 (18.2)
Active smoking			
Yes	13 (76.5)	30 (46.2)	43 (52.1)
No	4 (235)	35 (53.8)	39 (47.6)
Total number of sexual partners			
1	2 (11.8)	10 (15.4)	12 (14.8)
2-4	11 (64.7)	37 (57.0)	48 (59.3)
5-7	2 (11.8)	11 (16.9)	13 (16)
8+	2 (11.8)	5 (7.7)	8 (9.9)
ASLI	16	16	16
Condom use			
Never	11 (64.7)	43 (66.2)	54 (65.9)
Sometimes	5 (29.4)	21 (32.3)	26 (31.7)
Always	1 (5.9)	1 (1.5)	2 (2.4)
History of STD			
No	11 (64.7)	57 (87.7)	68 (83)
Yes	6 (35.3)	8 (12.3)	14 (17)

ASLI: Active sexual life initiation
STD: Sexually transmitted diseases

Table 1: Social and demographic features of imprisoned women in the state of Yucatan, Mexico.

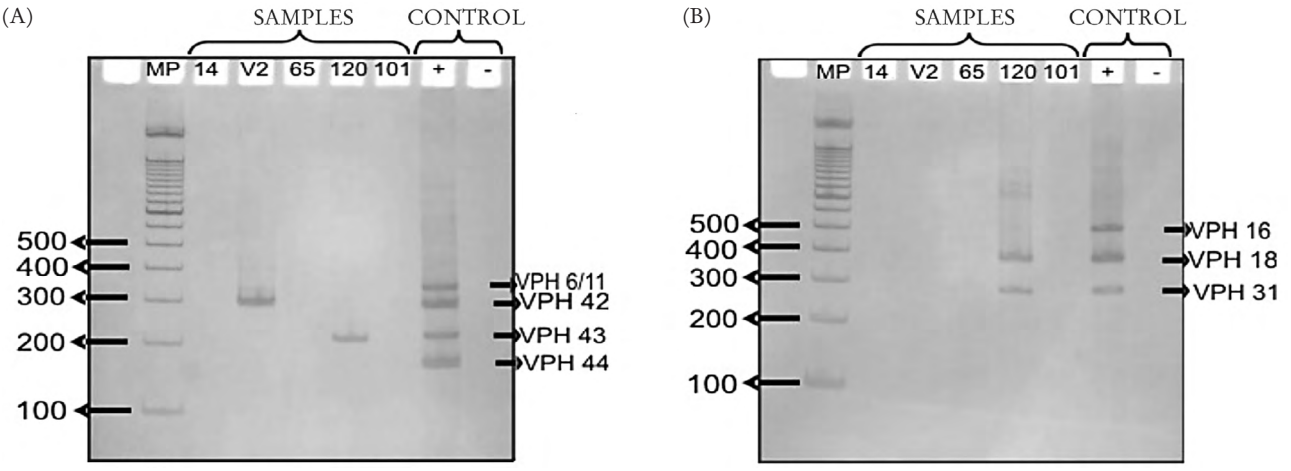

Figure 1: Multiplex nested PCR genotype amplification. (A) Lane 1: empty; Lane 2: Molecular weight marker; Lanes 3, 5 and 7: samples with sheets 14, 65 and 101 correspondingly negative for genotypes HPV 6/11, 42, 43 and 44; Lane 4: sample V2 positive HPV 42; Lane 6: sample 120 positive HPV 43; Lane 8: positive control; Lane 9: negative control. (B) Lane 1: empty; Lane 2: Molecular weight marker; Lane 3, 5 and 7: samples with sheets 14, V2, 65 and 101 correspondingly negative for HPV types 16, 18 and 31; Lane 6: sample 120 positive for HPV types 18 and 31; Lane 8: positive control; Lane 9: negative control.

for imprisonment were: robbery (30.5%), crimes against public health (29.3%) and homicide (16.6%). As far as the initiation of sexual life is concerned, the average age was 16 years (ranged between 11 and 23), and 85.4% have had at least 2 sexual partners throughout their lives, 65.9% never uses a condom during sexual intercourse and over 50% are active smokers.

All the results for Pap smear testing were negative for cervical cancer or its precursor lesions, 17.1% of women had Gardenerella, 14% vaginosis and 4.9& trichomoniasis.

The global prevalence for HPV was 20.7% (17/82). In 94.1% (16/17) samples the corresponding genotype was identified: Figure 1 shows the laboratory test results. 15 different genotypes were described: 60% (9/15) corresponded to low risk HPV types, 26.7% (04/15) to high risk HPV types and 13.3% (2/05) were classified under neither groups. The prevalence for different genotypes was as follows: HPV 6/11 (14.2%), 31, 39, 58 and 42 (9.5% each) and finally 31, 16.18, 33, 52, 43, 51, 68, 71, 81 and 102 (4.7% each). 23.5% (4/15) positive samples presented multiple infections: HPV 31-42; HPV 6/11-16, HPV 31-42 and one sample presented 3 genotypes: HPV 18-31 and 43.

As far as the age of HPV patients, the mean was 32.2 years (ranged between 21 and 49), 41.1% of women between 25 and 34 years old were positive for HPV infection. As to sexual practices, 70.6% mentioned to have had sex in prison, 41% with their sexual partner who is outside prison, 41 % with men in prison and 16.7% with both.

When carrying out statistical analysis to determine the association between variables and HPV infection, relevant statistical significance was observed with active smoking. Table 2.

Variables	ρ	OR 95% CI
Drug abuse	0.6287434	0.98 (0.98-8.41)
Active smoking	0.0258501	3.79 (1.01-15.58)
Contraceptive use	0.4671148	0.61 (0.12-2.92)
Condom use	0.9107514	1.07 (0.30-3.69)
STD	0.2438215	2.19 (0.47-9.9)
Urban area	0.2368778	2.23 (0.51-11.00)
Rural area	0.2368778	0.45 (0.09-1.94)
Sexual intercourse within CERESO (Social re-adaptation centre)	0.2457424	1.50 (0.42-5.6)

Table 2: Variables associated to HPV infection in imprisoned women in the state of Yucatan, Mexico

DISCUSSION

Prisons are places burdened by the coexistence of several risk factors concerning the acquisition of STD; consequently its population is considered a highly vulnerable group. The aforementioned issue has been

well reported in men, yet the evidence concerning women is still poor.

HPV infection is currently a relevant health issue with a great social impact, since it is the most common viral STD and the main cause for gynecological consultation [17]. The PCR technique has been broadly used to identify HPV worldwide. Nevertheless, it is worth noting that among its limitations we can find the possibility of false positive results due to contamination when necessary standards of care are not properly followed, such as the use of different spaces for different processing phases. The usefulness of working with more than a pair of initiators to reveal the infection has been published, since sometimes a sole pair of primers may lead to false negative results[18]. This report only used a pair of oligonucleotide primers, so therefore the prevalence of the infection could be actually higher.

The presence of HPV in imprisoned women has been researched in Brazil, United States and Spain, which a prevalence ranging between 21% and 46%. In our report, a prevalence of 20.7% has been observed, similar to the one reported in Brazil (21.1%) but lower than in other studies [10-13].

It is certain that women infected by the human immunodeficiency virus are more vulnerable to HPV infection and a high prevalence for the later has been reported in this population group [19, 20]. Due to the aforementioned, this study also included HIV detection by means of rapid HIV test kits (Determiner, Abbot®), with which one woman 5.1% (1/82) resulted positive. This result contrasts with those reported by other studies, where the prevalence ranged between 14.5% and 56.1% [19, 21, and 22]. The low prevalence for HIV could be influenced by a lower HPV prevalence than that expected for the group under study.

The presence of HPV in cytologically normal women has been reported worldwide, with a very diverse prevalence depending on the area under study. In 2005, a study carried out by Clifford et al with 15,613 samples of women from different countries reported a prevalence ranging between 1.4 and 25.6% [23]. In Mexico, studies of HPV prevalence in cytologically normal women from the general population revealed results between 3% and 14.5% [24-26].

Scientific evidence on the relationship between smoking and HPV has risen in the last ten years. Cuiliano and cols. have proven that smoking is related to persistent infections in women and anogenital infections in men [27-28]. This study revealed that smoking is associated to HPV, something which reinforces what has been previously published.

From the total population under study, six women were sex workers: 50% were HPV positive: a higher prevalence than that observed in women with other occupations (14.5%). This reveals that sex workers are an important link in the transmission chain of this virus [21, 22, 29].

From all HPV positive women, 29.4% had not had sex during their imprisonment and so they had become infected previously, another 29.4% had sex with male inmates and therefore it could not be established whether infection had taken place before or during imprisonment. This clearly shows how women and men in prison can play a determinant role in the transmission of STD both inside and outside prison.

It is worth noting that one of the main limitations of this study is the size of the sample since only 63% of imprisoned women in the state of Yucatan at that time took part in it. Nonetheless, results are relevant since they contribute to the understanding of HPV epidemiology in a poorly researched group: imprisoned women.

Imprisoned individuals are not completely isolated from the community as it would initially seem: sexual intercourse is an important link between prisons and the outside community. Therefore, we believe that it is highly important to raise awareness among prison authorities to implement STD detection programs and workshops where inmates can learn how to live their sexuality without jeopardizing their health. We must remember that any measure aimed at reducing the incidence of STD in prisons not only improves quality of life in prison but it also has an effect on society.

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