Human papillomavirus prevalence and frequency of sexually transmitted diseases in encarcered women by self-sampling approach

Hilka Flávia Barra Espírito Santo Alves Pereira[1,2,3]* , Gabriel Pacífico Seabra Nunes[4] ,
Henrique Vieira Pereira[2] , Karollina Deon e Silva[4] , Maiara Magri Pereira Olenchi[4] ,
Thais Cristina Fonseca da Silva[2] , Valbécia Tavares de Aguiar[4] , Valéria Santos da Costa[4] ,
Kátia Luz Torres[2,3] , Agnaldo Lopes da Silva Filho[5]

SUMMARY

OBJECTIVE: This study aimed to assess the sociodemographic and clinical profile of women deprived of their liberty and to identify the prevalence of sexually transmitted diseases and human papillomavirus through self-sampling samples.

METHODS: This is an epidemiological, cross-sectional, observational, and descriptive study of the prevalence and correlation of the diagnosis of human papillomavirus infection in 268 encarcered women in Amazonas submitted to self-sampling from June 2019 to September 2020 using the genotyping analysis. Patients with positive and inconclusive results were evaluated by commercialized PCR to detect pathogens causing sexually transmitted diseases. The sample size used was based on a convenience sample.

RESULTS: In 268 women, human papillomavirus DNA was detected in 87 (32.5%) of them. Sexually transmitted diseases were detected in 30 (34.48%) of the 87 women with a positive or inconclusive result for human papillomavirus. Women with more than three pregnancies had a higher risk of human papillomavirus detection (p=0.004).

CONCLUSION: The prevalence of human papillomavirus and other sexually transmitted diseases in encarcered women in Amazonas is 32.5 and 34.48%, respectively. Most women were single (60.4%) and reported having had more than 15 partners (90.8%).

KEYWORDS: Sexually transmitted disease. Screening. Prisoner. Human papillomavirus viruses.

INTRODUCTION

Studies suggest that the association between HPV infection and other sexually transmitted diseases (STDs) represents a public health problem with biological and psychosocial repercussions that would be considered cofactors that favor cervical carcinogenesis[1].

Encarcered women are more exposed to risk factors for STDs such as irregular condom use, multiple partners, sex at risk, use of illicit drugs, and smoking[1,2].

Self-sampling is a screening strategy for encarcered women with difficult access to the health system and may be an alternative to a previous study[3], as it has greater sensitivity for detection of HPV and also the possibility of diagnosing STDs that are considered cofactors for viral persistence, and it may also be a strategy for places where the performance of colpocytology is not possible[4-6].

Encarcered women present peculiarities and complexity that justify studies to improve health care. These women are on the margins of the health system in Brazil, despite being a risk group for HPV infection and other STDs. Thus, this study aimed to assess the sociodemographic and clinical profiles of encarcered women and identify the prevalence of STDs and HPV infection through a self-sampling approach. The data from this study open up a perspective on the use of this screening method, favoring broader screening for populations with difficult access, such as encarcered women.

METHODS

This is an epidemiological, cross-sectional, observational, descriptive, and analytical study of the prevalence and association of the diagnosis of HPV AND STDs in encarcered women by self-sampling. The women belonged to the female prison system of Amazonas, totaling 281 women from June 2019 to September 2020. Sexually active women who agreed to participate in the research after completing the Informed Consent Form were included. Hysterectomized, virgin, and pregnant women were excluded. The sample size used was based on a convenience sample. The present study was submitted and approved by the Ethics and Research Board of the Federal University of Amazonas (UFAM) with the opinion number 3.421.145, CAAE 15976719.3.0000.5020 on June 27, 2019.

The selected women were instructed to perform self-sampling with the COARI® Kolplast device, and samples were analyzed by Cobas® 4800 HPV CTNG Test (Roche®) following all the manufacturer's specifications. Women who had positive results for HPV 16, HPV 18, and other high-risk and inconclusive types were submitted to the PCR Panel (XGEN MULTI UP Kit MULTIPLEX Plus) by Mobius Life Science for detection of STD-causing pathogens using the same self-sampling sample. The following pathogens were evaluated: *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Mycoplasma hominis*, and *Ureaplasma urealyticum*.

Orientation for self-sampling samples was carried out by the researchers in the prison system itself. It was evaluated as a characteristic of the sociodemographic and clinical profile of the population studied. The self-samples were stored at room temperature and sent to the IPOG Laboratory in São Paulo, Brazil, for detection analysis and genotyping.

Statistical analysis was performed using the R version 3.5 software (R Core Team, 2019). The difference between the groups was evaluated by the Mann-Whitney or Kruskall-Wallis test. To verify the association between qualitative variables, Fisher's exact test was used. A p-value of <0.05 was considered statistically significant.

RESULTS

Of the 281 women eligible for the study, 12 were excluded for being hysterectomized and 1 for being pregnant. Finally, 268 women were included (Figure 1).

Most women were single (60.4%) and reported having had more than 15 partners (90.8%). None of the patients had received the HPV vaccine (Table 1).

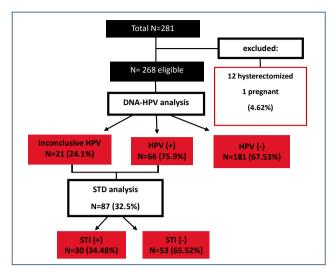Among the 268 women studied, 87 (32.5%) had detectable HPV DNA, including HPV 16 in 12 women (13.8%),

Figure 1. Flowchart of allocation of women in the study.

HPV 18 in three patients (3.5%), HPV other in 51 (58, 6%), and 21 women (24.1%) had inconclusive results (Table 2).

STDs were detected in 30 (34.48%) of the 81 women with a positive or inconclusive result for HPV (Figure 1). The most frequent pathogens were *Mycoplasma hominis* 23 (26.4%), *Chlamydia trachomatis* 7 (8%), *Ureaplasma urealyticum* 5 (5.7%), and *Neisseria gonorrhoeae* 1 (1%).

Among the 268 women studied, 87 (32.5%) had detectable HPV DNA, with HPV 16 in 12 women (13.8%) (Table 2). The most frequent pathogens were *Mycoplasma hominis* 23 (26.4%) and *Chlamydia trachomatis* 7 (8%).

As shown in Table 1, women with more than three pregnancies had a higher risk of HPV detection compared to those with fewer pregnancies (77.0 versus 23.0%, p=0.004).

DISCUSSION

The prevalence of HPV infection in the population was elevated, the prison system presents greater exposure to transmission, and women have the possibility of acquiring STDs, deserving a differentiated look due to the risks that represent all STDs, especially HPV, which is considered a public health problem[4]. It is worth mentioning that this population was not vaccinated, and this fact may contribute to the high prevalence in this population. By incorporating self-sampling and examination for STDs through PCR in the study, we have the possibility to demonstrate that screening through this methodology can minimize access difficulties, embarrassment, shame, and sociocultural aspects while also improving the sensitivity of the diagnosis. In this way, it becomes a new perspective to reduce the incidence of cervical cancer[5].

Table 1. Associated risk factors in encarcered women in Amazonas (Brazil) with human papillomavirus and detectable sexually transmitted diseases.

| Variant | Total n=268 (%) | HPV test result | | p-value | Total n=87 (%) | STD test result | | | p-value |
		Positive n=87 (%)	Negative n=181 (%)			Positive n=30 (%)	Negative n=53 (%)	Inconclusive n=4 (%)	
Age (years)									
18–26	74 (27.6)	33 (37.9)	41 (22.7)		33 (37.9)	12 (40)	19 (35.8)	2 (50)	
27–35	97 (36.2)	30 (34.5)	67 (37)		30 (34.5)	10 (33.3)	19 (35.8)	1 (25)	
36–44	64 (23.9)	16 (18.4)	48 (26.5)	0.0926	16 (18.4)	5 (16.7)	11 (20.8)	–	0.6758
45–53	27 (10.1)	6 (6.9)	21 (11.6)		6 (6.9)	3 (10)	2 (3.8)	1 (25)	
Over 53	6 (2.2)	2 (2.3)	4 (2.2)		2 (2.3)	–	2 (3.8)	–	
Number of pregnancies									
Up to 3 pregnancies	173 (64.6)	67 (77)	106 (58.6)	0.0040	67 (77)	21 (70)	42 (79.2)	4 (100)	0.4467
More than 3 pregnancies	95 (35.4)	20 (23)	75 (41.4)		20 (23)	9 (30)	11 (20.8)	–	
Condom use									
No	85 (31.7)	30 (34.5)	55 (30.4)	0.5752	30 (34.5)	9 (30)	19 (35.8)	2 (50)	0.6255
Yes	183 (68.3)	57 (65.5)	126 (69.6)		57 (65.5)	21 (70)	34 (64.2)	2 (50)	
Contraceptive use									
No	144 (53.7)	45 (41.7)	99 (44.7)	0.6954	45 (51.7)	16 (53.3)	26 (49.1)	3 (75)	0.707
Yes	124 (46.3)	42 (48.3)	82 (45.3)		42 (48.3)	14 (46.7)	27 (50.9)	1 (25)	
Number of partners									
Up to 15 partners	233 (86.9)	79 (90.8)	154 (85.1)	0.2463	79 (90.8)	27 (90)	48 (90.6)	4 (100)	1.0000
Over 15 partners	35 (13.1)	8 (9.2)	27 (14.9)		8 (9.2)	3 (10)	5 (9.4)	–	
Age of first sexual intercourse									
Up to 15 years	192 (71.6)	67 (77)	125 (69.1)	0.1949	67 (77)	24 (80)	39 (73.6)	4 (100)	0.6115
Over 15 years	76 (28.4)	20 (23)	56 (30.9)		20 (23)	6 (20)	14 (26.4)	–	
Use of drugs									
No	95 (35.4)	29 (33.3)	66 (36.5)	0.6831	29 (33.3)	11 (36.7)	18 (34)	–	0.4527
Yes	173 (64.6)	58 (66.7)	115 (63.5)		58 (66.7)	19 (63.3)	35 (66)	4 (100)	
Cigarette use									
No	133 (49.6)	47 (54)	86 (47.5)	0.3617	47 (54)	16 (53.3)	30 (56.6)	1 (25)	0.5327
Yes	135 (50.4)	40 (46)	95 (52.5)		40 (46)	14 (46.7)	23 (43.4)	3 (75)	

Table 2. Prevalence of human papillomavirus in self-sampling samples from encarcered women in Amazonas (Brazil).

HPV type	n=87 (%)
HPV 16	12 (13.8)
HPV 18	3 (3.5)
Inconclusive HPV	21 (24.1)
Other HPVs	51 (58.6)

HPV: human papillomavirus.

With regard to the number of pregnancies, in the series, 26.9% had 4–6 pregnancies, similar to data from the study carried out in the prison system in São Paulo, which reported that 68.3% had 1–3 pregnancies[2]. Multiparity is considered a risk factor for cervical cancer; in the series, it showed a slight association with the presence of HPV.

Sexual intercourse at an early age favors the vulnerability of the cervical epithelium to the occurrence of infection by the HPV. In the sample, sexarche in the age group of 15 years was more frequent in 24.6%, corroborating studies carried out in the Prison System in Mato Grosso do Sul[4]; however, the association of HPV infection with early sexarche showed no statistical difference in this population.

In relation to drug use and smoking, the prison population of Amazonas has high rates; however, in the case series, there was no statistical difference regarding the presence of HPV, in disagreement with other studies[6]. Although the association between the number of partners and drug use has shown signs

of dependence for the detection of HPV, this may demonstrate the importance of associated cofactors for infection.

The persistence of HPV infection is the main cause of cervical cancer[1,7], but there are factors that favor its persistence, and sexually transmitted infections are considered cofactors. In the series, the association occurred, with 30% positivity for STDs in women with detectable HPV; similar data from other series showed an association with HPV in 47.4%, with *Chlamydia trachomatis* being the most frequent in the study carried out in Belo Horizonte[7].

In this study, *Mycoplasma hominis* was more prevalent, with the association with HPV 16 being more frequent in 41.7%, especially in the age group of 18–35 years, demonstrating that the microbiome influences the pathophysiology of intraepithelial lesions, especially in this younger age group, and that when associated with Mycoplasma hominis, it can influence HPV infection[7].

The study had limitations as to having performed the HPV DNA test in the entire prison population regardless of age as recommended by the Ministry of Health in women under 30 years of age; however, the strengths of the study allow demonstrating the profile of a population where the health system is not effective and the possibility of the use of self-sampling associated with the HPV DNA Test and STD by PCR to become an effective screening method for these women.

The data from this study open up a perspective on the use of self-sampling, favoring broader screening for populations with difficult access, such as encarcerated women.

In conclusion, self-sampling can be an alternative screening method for HPV and other STDs, yet this population is considered a risk group for HPV and other STDs. The prevalence of HPV and other STDs in encarcerated women in Amazonas is 32.5 and 34.48%, respectively. Most women were single (60.4%) and reported having had more than 15 partners (90.8%).

AUTHORS' CONTRIBUTIONS

HFBESAP: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **GPSN:** Data curation, Writing – original draft. **HVP:** Data curation. **KDS:** Data curation. **MMPO:** Data curation. **TCFS:** Data curation, Writing – original draft, Writing – review & editing. **VTA:** Data curation. **VSC:** Data curation. **KLT:** Conceptualization, Formal Analysis, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing. **ALSF:** Conceptualization, Formal Analysis, Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing.

REFERENCES

1. Kops NL, Bessel M, Horvath JDC, Domingues C, Souza FMA, Benzaken AS, et al. Factors associated with HPV and other self-reported STI coinfections among sexually active Brazilian young adults: cross-sectional nationwide study. BMJ Open. 2019;9(6):e027438. https://doi.org/10.1136/bmjopen-2018-027438

2. Silveira, SFS. Sociodemographic profile and cytological findings in the cervix of the female population deprived of liberty in the state of São Paulo. Dissertation (Master's), Postgraduate Program of Fundação Pio XII, Hospital de Câncer de Barretos. Sao Paulo; 2016.

3. Mao C, Kulasingam SL, Whitham HK, Hawes SE, Lin J, Kiviat NB. Clinician and patient acceptability of self-collected human papillomavirus testing for cervical cancer screening. J Womens Health (Larchmt). 2017;26(6):609-15. https://doi.org/10.1089/jwh.2016.5965

4. Schwambach, AF. Prevalence and risk factors associated with human papillomavirus infection in women deprived of liberty in Mato Grosso do Sul. Dissertation (Master in Health Sciences), Faculty of Health Sciences, Federal University of Grande Dourados, Dourados, MS; 2016. p. 47.

5. Sawaya GF, Smith-McCune K, Kuppermann M. Cervical cancer screening: more choices in 2019. JAMA. 2019;321(20):2018-9. https://doi.org/10.1001/jama.2019.4595

6. Torres KL, Mariño JM, Pires Rocha DA, Mello MB, Melo Farah HH, Reis RDS, et al. Self-sampling coupled to the detection of HPV 16 and 18 E6 protein: a promising option for detection of cervical malignancies in remote areas. PLoS One. 2018;13(7):e0201262. https://doi.org/10.1371/journal.pone.0201262

7. Lima LM, Hoelzle CR, Simões RT, Lima MIM, Fradico JRB, Mateo ECC, et al. Sexually transmitted infections detected by multiplex real time PCR in asymptomatic women and association with cervical intraepithelial neoplasia. Rev Bras Ginecol Obstet. 2018;40(9):540-6. https://doi.org/10.1055/s-0038-1669994